Pallid Sturgeon Annual Report
2004

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Introduction:

The Bozeman Fish Technology Center (BFTC) became involved with the pallid sturgeon recovery efforts in June of 2000. This was primarily due to the detection of the iridovirus below Fort Peck Dam and not above the dam. Concerned that the virus might be a limiting factor to the recruitment of young pallid sturgeon, only fish spawned above Fort Peck Dam would be allowed for mitigation stocking above the dam. The location, water source, and hatchery capacity for rearing pallid sturgeon made the BFTC an ideal facility to join the restoration efforts.

Spawning:

Riverside spawning was unsuccessful in 2003 above Fort Peck. Although five males were captured and milt was stored for the cryopreservation program, no females were captured. However, with the approval from the State of Montana, pallid eggs from females spawned below Fort Peck dam would be allowed to be incubated at the BFTC. If they tested negative for the iridovirus they would be allowed to be stocked above the dam in RPA #1. The main reason for the approval was to maintain juvenile recruitment and not lose more than two years of successive stocking. Pallid eggs were received from Garrison National Fish Hatchery (GNFH) and the Miles City State Fish Hatchery (MCSFH). Six family lots were received from the GNFH. Of the six only two lots produced any progeny. 140 to 150 mls of eggs were received from each lot. An approximation of eggs per ml was established to be approximately 40 to 45 eggs/ml.

Garrison lots:

Lots that did not produce progeny:

Male	Female
2A6B	6070
521A	6070
592B	6070
2A6B	694A

Lots that did produce progeny:

Male	Female
3031	6070
3C5D	6070

There was no quantitative analysis on percent hatch from the groups that did not produce. An estimated hatch ranged from 5% to 20% with 100% mortality occurred with in 21days. When the eggs did hatch, the fish appeared to be very lethargic and lay on the bottom of the tank. They never used the full water column or expressed any feeding behavior unlike those that did survive. For the lots that did produce progeny an estimated hatch ranged from 30% to 50 % . Fish were visually monitored until mid September and then numerated. With an estimated 6000 eggs per lot (40eggs/ml x 150 mls of eggs = 6000eggs) a percent survival was established from hatch to three months old. Lot 3031 x 6070 had 10.13% survival and lot 3C5D x 6070 had a 0.8% survival respectively.

Miles City lots:

Lots that did not produce progeny:

Male	Female
552A	586A

Lots that did produce progeny:

Male	Female
486A	4855
540A	4855
621A	586A
0123	586A
0123	3948

There was no quantitative analysis done on percent hatch of these groups. An estimated hatch ranged from 45% to 65% for the lots that produced progeny. Percent survival was calculated at age three months using the same method as the lots from Garrison. Lot 486A x 4855 had a 36.9% survival, 540A x 4855 had a 12.3% survival, 621A x 586A had a 22.7% survival, 0123 x 586A had a 2.2% survival, and lot 0123 x 3948 had a 1.3% survival. The lot that did not produce progeny had an estimated hatch around 10% and there was 100% mortality with in 21 days. Again, when the eggs hatched the fish seemed very lethargic and did not express any feeding behavior.

Culture Activities:

As of 4/09/04 there are a total of seven family lots located at the BFTC.

Male	Female	Total #`	To be stocked in RPA #1	Surplus Fish ?	Potential for Brood
3031	6070	474	474		
3C5D	6070	37	37		
540A	4855	471	471		
486A	4855	1404	889	515	
621A	586A	855	855		
O123	586A	60	60		
O123	394A	53	0		53

(1360/ female to be stocked for mitigation/RPA #1 ??)

In previous years it was recommended that YOY pallid sturgeon remain on warmer water through out their rearing period to induce a higher growth rate. Last year (2002) it was recommended that YOY fish are exposed to a temperature regime to produce a more natural environment. It was felt that the temperature regime did not need to exactly mimic what happens in the wild that there should be at least a 15° F to 20° F change. The temperature regime at the BFTC over the rearing period was as follows:

	Range	Mean
Egg incubation	64º - 60º	62º
July 1st - Oct 20th	70º - 66º	68º
Oct 21st - Nov 12th	66º - 60º	63º
Nov 13th - Dec 10th	62º - 54º	57º
Dec 11th - Jan 16th	55º - 52º	53º
Jan 17th - Feb 22nd	51º - 54º	52º
Feb 23rd - Mar 27th	52º - 56º	54º
Mar 28th - Apr 26th	56º- 60º	58º
Apr 26th - May 29th	60º - 66º	64º

After May 29th the fish will be tempered up to 68° to 72° degrees F. Three weeks prior to stocking, the rearing water temperature will be increased or decreased to match the receiving water.

Feed was added to the tank prior to the fish passing the yolk plug. This was done to induce feeding behavior directly after passing the plug. Feeding rates directly post hatch were not calculated. Fish were fed to satiation by observation with bio-diet starter. Cyclop-eeze (micro-crustaceans) was also fed three to four times daily by hand.

After the fish were approximately one inch, initial feeding rates were based on equations derived from the Fish Hatchery Management book. After initial rates were established, observations were made to alter feed weight as necessary. Size of feed was estimated from the average fish length. A specific nutritional diet was developed at the BFTC to reduce pectoral fin curl. The experimental feed did show a trend in slowing the fin curl but, did not eliminate deformity. However, it was generally observed that the scutes and fins are of better quality for the 2003 class.

Condition factors were calculated every month. This was done by weighting and measuring twenty-five fish from two tanks per month. Tanks were sampled on alternate months to reduce handling. All data collected was plotted to produce length weight relationships. It was also observed that fish per pound or length did not change very much during the months of November through late February. water temperatures were coldest during those months averaging 54° F. During that time, some fish were evaluated by Fish Health Center (FHC) personnel. It was determined that the stomach and intestine were filled with feed and that there was little to no food absorption. This may indicate that the metabolic rate of these fish are suppressed at relatively moderate temperatures.

An approximate tank density was calculated by weights taken from the condition factors every month. Densities were as follows:

Average	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**
Density lbs/ft²	0.102	0.1418	NA	0.1872	0.2944	0.3215	0.532
Wgt / F in gr.	8.3	14.5	NA	15.6	25.5	28.4	43.1
Length (mm)	128.5	160	NA	160	196.1	200	221.5
Fish/Lbs	56.5	32.6	NA	31.7	18.1	16.3	11.8
Condition Fac. (C)	1400	1300	NA	1300	1200	1300	1300
Temperature	63°	57°	53°	52°	54°	58°	64°

Mortalities were significant during the first 1 ½ months post hatch. After that survival increased dramatically. In the beginning of January, mortalities began to rise. Several fish were sent to the Bozeman Fish Health Center for a health inspection. The results yielded gas bubbles in the gills and inflamed kidneys. Upon histology, kidney tubules were observed to be necrotic. This condition is indicative of an exposure to a toxin. The toxin was traced back to a specific event. In October, 2003 (October, 25th) an ozone generator fire spread soot though out the containment building were the sturgeon were reared. Additional tests were done one month after identifying the kidney condition. These results yielded improved conditions observing the tubules regenerating.

Tank # (6')	Total % From Aug - Mar	Total # morts From Aug - Mar	Lot #
1	3.03	6	586A x 621A
2	6.07	12	586A x 621A
3	2.51	5	6070 x 3031
4	0.50	1	4855 x 540A
5	3.01	6	4855 x 486A
6	1.51	3	4856 x 486A
7	3.54	7	4857 x 486A
8	1.00	2	4858 x 486A
9	0.00	0	4855 x 540A
10	0.50	1	6070 x 3031
11	2.00	4	586A x 621A
12	5.08	10	586A x 621A

Tank # (4')	Total % From Aug - Mar	Total # morts From Aug - Mar	Lot #
1	1.47	1	6070 x 3031
2	0	0	6070 x
3	0	0	394A x 0123
4	4.87	5	4855 x 486A
5	3.06	3	586A x 621A
6	0	0	empty
7	13.2	13	4855 x 486A
8	2.1	2	4855 x 540A
9	10.9	6	586A x 621A
10	22.6	19	586A x 0123
11	15.8	11	6070 x 3031

Stocking:

Stocking to RPA #1will take place in late July to mid August to avoid high flows and high temperatures. All fish will be PIT and elastomer tagged sometime in early to mid July. Weight and lengths will also be recorded to the appropriate PIT tag for future growth data. There will be four stocking locations including: Fred Robinson Bridge, Coal Banks, Judith Landing, and Loma. Each family lot (six families) will be equally represented at each of the stocking locations. One family lot , 0123 x 394A @ 53 fish, will be transported to Gavins Point National Fish Hatchery (GPNFH) for future brood stock.

An annual pre-release health assessment was completed in March. Six families were evaluated from a cross of three females. A gross necropsy, liver condition, skin condition and viral status were the four general aspects of the assessment. The results included:

Female #6070

Gross Necropsy: length - 196.7, weight - 25.2, no lesions reported.
Viral status: pectoral fin - all negative, Barbel - all negative
Liver condition: fat vacuolation - mean of 3.14
Skin condition: mucus cells - pectoral fin , mean of 46.6
sensory epithelial - barbel, mean of 4.13/field

Female #586A

Gross Necropsy: length - 184.5, weight - 21.5, no lesions reported.
Viral status: pectoral fin - all negative, Barbel - all negative
Liver condition: fat vacuolation - mean of 3.18
Skin condition: mucus cells - pectoral fin , mean of 34.5
sensory epithelial - barbel, mean of 1.8/field

Female #4855

Gross Necropsy: length - 179.2, weight - 20.4, no lesions reported.
Viral status: pectoral fin - all negative, Barbel - all negative
Liver condition: fat vacuolation - mean of 3.15
Skin condition: mucus cells - pectoral fin , mean of 88.0
Sensory epithelial - barbel, mean of 4.57/field

Research:

Research completed in 2003 included two dietary supplementation studies associated with lipid deposition in the liver and a fin curl evaluation. With the low number of experimental fish only two of the six diets could be evaluated for the fin curl study. It was observed that fin curl was already present prior to the start of the study (fish @ 2 ½ months). However, the test diet did show a trend in slowing the deformity. Data is still being processed for the fin curl evaluation and pending the number of fish available a follow up study will occur in 2004. The lipid deposition study will be presented at the AFS meeting at Madison, WI in August 2004. Four experimental feeds containing 8, 14, 20 or 24% fat were fed to 5 tanks with 20 fish per tank. Water temperature was held at a constant 70F, and the experimental feeds were fed to satiation for 177 days. There was a linear response of growth to increasing dietary fat. The fish fed the 8% fat gained 85 g/f, compared to the 160 g/f for those feed the 26% fat. No effect of dietary fat on liver fat was observed. Liver conditions scores were only changes by feeding the 8% fat diet. The difference between the scores from the diets were considered statistically different

but they were not considered to be biologically different. Thus poor liver conditions (scores of 4+ to 5) observed in production hatcheries are probably not due to dietary fat alone. Feeding diets with high fat content will increase growth rate without increasing liver fat levels or decreasing liver condition scores, with the rearing conditions used in this trial.

Additional studies that were completed were an anaesthetic trial comparing Aqui-s and MS-222 and a bio-energetic model. The anesthetic trail was recently completed in May and the data is still being processed. Some of the preliminary data are indicating promising results (Jim Bowker, contact person, 406 587-9265 x126). The bio-energetic model was completed in late February and a follow up trial will take place in September with a different year class of fish (pending fish numbers). Data for the bio-energetic model is also being processed (Rob Klumb, principle investigator, 605 224-8693 x28).

PALLID STURGEON PROPAGATION
2003
Garrison Dam NFH

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Background/Introduction

The Pallid Sturgeon Recovery Plan (1993) established guidance for collection of wild brood fish, propagation, research needs, and reintroduction of progeny to accomplish recovery goals. This hatchery's role in the recovery effort focuses on the development of techniques for spawning and rearing of pallids and propagation for augmentation. Pallid Sturgeon propagation at Garrison Dam NFH began in 1997. Successful spawning has occurred annually since 1998. Both the 1999 and 2000 year classes propagated at Garrison were destroyed after being identified positive for Shovelnose Sturgeon Iridovirus (SSIV). April 2002 marked the first stocking of yearling (2001 year class) pallids from this facility. Recapture data from the stocked fish indicates that they have assimilated well to their native waters.

Objectives

Objectives for this year will be renewed emphasis on augmentation. All four hatcheries used in past pallid propagation will be utilized in 2003. We will attempt to collect three females and twelve males for spawning at Garrison Dam NFH. In addition to spawning and rearing of the twelve 2003 'confluence' family lots, the hatchery will again pursue spawning from the Upper Missouri River spawning site on the CM Russell NWR. Pairing for family lots will be based on results from the Genetics Lab at UC Davis. We plan on producing (3) 1X4 matings using the twelve broodfish. We will also evaluate fertilization rates using cryopreserved milt from both the 0.5 and 5ml straws.

Miles City SFH will be supplied with six adults, four males and two female. In addition to spawning in June they will be culturing four family lots from 2002 to a tagable size prior to stocking in RPA #2 later in the summer. Eggs from the Miles City spawning will be held at both the Miles City hatchery and Gavins Point NFH.

Bozeman FTC will be propagating 2003 progeny for stocking RPA #1. Plans are to spawn riverside again on the CM Russell Refuge. Eggs from this spawning event will be held at both the Bozeman hatchery and Garrison Dam NFH. Bozeman FTC will also be able to bring in eggs from both Miles City and Garrison Hatcheries for propagation.

Work will continue on PCR confirmation tests and in locating SSIV positive adult sturgeon in the upper Missouri River above Fort Peck Reservoir. Research into the advancement of a PCR diagnostic test was to be accomplished at the University of California, Davis campus under the direction of Dr. Ron Hedrick. Additional samples of the 2002 year class fish that had been suspect for the virus were sent this Spring for use in the development and testing process.

Spring Capture 2003

Methods and Results

Pallid Capture at the Confluence

Through the efforts of the Montana Parks and Wildlife, the US Geological Survey, and the US Fish and Wildlife Service, pallids were captured near the confluence for Spring spawning. Water flows this year appeared to have triggered an upstream movement of the pallids as the majority of the fish were collected in the Yellowstone River upstream of the confluence near the Highway 200 bridge. Three females and eleven males were held at Garrison Dam NFH for spawning efforts. Three females and four males were transported to the Miles City SFH (Table 1).

Chronology of capture:

April 22 - Five boats fishing from 10:00 am through 5:00 pm. The four fish collected, all suspect males, were transported to Miles City SFH (7F7F065A4E, 115669540A, 132114552A, and 1F4B225A1A). Suspect 'male', A1A had previously been at the hatchery (2000) and collected in five of the past six years - a 'snaky' older looking fish. In 2000 it was injected but produced nothing, likely no longer capable of reproducing (this fish was later returned to the river when a more suitable candidate was found).

April 23 -Five boats fishing from 9:00 to 5:00. Four fish collected, one mature female, 7F7B026102, 1 confirmed male, 1F4A363031, the other two of unknown sex, 220E5F6E26 and 115675486A. The male, 1F4A363031, was one of two that was spawned at Garrison Dam NFH in 1998. Since the contribution from the male in 1998 was limited to only 100 progeny in RPA #2 we determined that it's genetic contribution was under-represented in the recovery program and that it's progeny could be stocked as well as having it's sperm cryopreserved.

April 24 - Two fish collected, one confirmed male, #7F7D291A07, the second a new fish, suspect male, #115676694A. The confirmed male was spawned in 1997 at Gavins Point Dam NFH. Progeny have been released from this fish but in low numbers (310 in RPA #2, 276 in RPA #1, and 181 in RPA #3). Cryopreservation of milt is needed as well as genetics workup on this fish. It will be used only as a backup for spawning purposes. Both fish were taken to Garrison Dam NFH.

April 25 - Three boats fishing fishing from 9:00-1:30. Two fish collected, one radio #26 the other a suspect male collected near Erickson Island - one of the few pallids collected in the Missouri River this year. The fish was taken to Garrison Dam NFH.

April 29 - Three boats fishing 9:00 - 5:00. Two fish were collected, one male, one female. The male # 1F47760123 was a recapture spawned at Garrison Dam NFH in 1998, the female # 132256586A, a 'new' fish. Both were taken to Miles City SFH. Since there were only 100 progeny from the male released in RPA #2 it is still a viable candidate.

April 30 - Two boats fishing 10:30 - 3:15. Three fish collected. The first was collected between the railroad and Hwy 200 bridges at 11:00 am. The fish is suspect male, new capture, tagged 132313521A. The second was an 'unknown' from 1995, tagged with two tags, 1F521B1E56/1F54696C38. The third fish was a male captured downstream of the Hwy 200 bridge. This fish had multiple tags, 41475D3C5D, 757D365422, and 4148382A26. This male was spawned in 1997 at Garrison Dam NFH but there were no progeny produced. The water temperature is 55EF. These fish were transported to Garrison Dam NFH. Also collected today were two radio tagged fish.

May 5 - Three boats fishing until 1:30, then only two. Collected two pallids, a female, #7F7F054855, spawned in 1999 at Garrison Dam NFH and an unknown 28 pound new capture, 115679394A (identified at spawning as a very small, gravid female). It will be interesting to note how female #855 performs. When spawned at Garrison, the ovulation went well, the egg fertility was nearly 50%, the hatch was good at 77% , but post spawn, all fry died within 8 days. The other two female lots did fine that year. Both fish hauled to Miles City and male # A1A returned to the river from Miles City.

May 6 - Two boats fishing until noon, three in the afternoon. Six fish collected (all later confirmed males), three were transported to Garrison Dam NFH. Pit tag #'s 7F7F06697C, 7F7D372A6B, 220E4E4E5D, and a new capture 132157621A.

May 7 - Captured four fish, three released at capture, the fourth taken to the hatchery, catheterized to determine sex (male - testes recovered), and returned to the river.

May 14 - Collected a 53 pound fish with spaghetti tag ES 10027 - pit tag not readable (7F7B016070), tagged in September of 1994. Tagged at the hatchery with PIT tag # 44426F185B. This fish is a gravid female.

Confluence Spawning at Garrison Dam NFH

Female #7F7B026102 was injected with LH-RH at 10:15 pm on the evening of June 23rd. The progesterone assay for this fish was 80% on June 17 and 100% on June 22. Polarity indices ranged from 0.07 to 0.1. The morning of the 24th at 11:30 the fish was given the resolving dose. The second female, #7F7B016070 was injected at 10:20 pm on June 23th. The fish was injected with LH-RH at the usual 0.005 mg/kg rate for the initial injection. The following morning she received the resolving dose of 0.045 mg/kg at 11:30.

Two of the 8 males were injected on the evening of June 23rd. The fish were injected at 0.02 mg/kg and given only a single injection, intramuscular. The two males selected have a very limited number of progeny stocked out from the 1997 and 1998 spawning events. They were injected in advance to provide milt if the females responded more quickly than anticipated and to

give us some lead time on cryopreservation since neither male is in the repository. The remainder of the males were injected on the afternoon of June 24th at 2:00 pm also with LH-RH. The males injected earlier, #1F4A363031 and 7F7D291A07, were 'cruising' around the perimeter of the tank in response to the hormone injections.

June 25th Spawning began on female 6070 at 11:50 am. Ovulation proceeded well throughout the day with collections of about 400 mls per palpation attempt. A total of seven family lots were produced with female #6070. Due to poor egg quality late in the take, the final two family lots were likely not to amount to much (Table 2). The first male used, 3C5D, was inadvertantly used prior to observing motility. Motility for that male was less than 1%. (Surprisingly, fertilization and survival rates indicated that even at a low motility, due to shear numbers, you can get good results). The second female #6102 is not responding well to the injections. At 2:45 pm we are finally able to express a couple eggs by palpation. It isn't until 8:30 that we get a fair quantity, 100 mls of eggs. The fourth try at 11:00 pm we get an additional 150 mls. An attempt at 12:00 and a half hour later provides only a few eggs. The following morning the fish is palpated, no eggs are expressed. Egg quality of those few collected is poor and no hatch results (Table 3).

When we attempted to aspirate milt from one of the injected 'males' we have a surprise - a few eggs are pulled into the catheter. The eggs from this 30 pound gravid female (#115676694A) are checked and based on the polarity index it appears to be in spawning condition. Small batches of eggs are expressed from this fish over the next 24 hours (Table 4). A total of 38,000 eggs are spawned from the fish but only 254 hatch and of that 8 survive to the first month - 4 end up as six inch fish transferred to Gavins Point NFH for future broodstock.

The only thing that has been consistent with our spawning efforts has been it's inconsistency. We verify the condition of the eggs right up until injections and using the established protocols our results have been varied. There is something in the final egg maturation and ovulation processes that is being overlooked. Fortunately, we have had at least one female each year that has ovulated successfully and progeny continue to be produced in quantities that exceed our capacity at the hatchery. Arrangements are made to transfer eggs from the spawned females to Bozeman FTC.

June 26th eggs numbers were evaluated and boxed for shipping. The Conte Research Center (USGS) had requested eggs for research on larval drift. Approximately 4,000 eggs (100 mls) were shipped in water via Fed Ex. The researchers in charge were Boyd Kynard and Erika Henyey. Eggs destined for the Bozeman National Fish Hatchery were also boxed. Five boxes of 150 mls per box representing five of the seven crosses from female # 185B (6070) were sent (males #1E56, 3031,521A,2A6B,592B). Hatchery personnel from the two stations met in Terry, MT to transfer the eggs. The following day the two met in Fallon, MT to exchange eggs from the second female #694A. Four family groups from this female were sent along with two family groups from female #185B (6070). The male cross, #3C5D, wasn't expected to produce viable eggs due to low motility but after a day's incubation it appeared like there would be viable progeny. The other cross was male # 2A6B.

On June 28th the eggs from female #185B (6070) and male crosses (3D5E, 1E56, 3031, 1A07, 521A) began hatching at about 5:00 pm. Water temperature is 68E F. The following day the final two families (592B, 2A6B) started hatching along with eggs from the family 694A X 2A6B.

On July 15th blood samples were taken from female #115676694A and three males. The female had turned pale and had acted lethargic for about a week. We were hoping that by evaluating blood levels we might get an idea of what the problem was and possibly correct it through IV injections. Five days later, on July 20th the fish was dead. Another female, #185B (6070), was now looking pale as well. On July 31st the fish was hauled back to the confluence. It was later found dead by the ND Game and Fish Department fisheries crew. Values for the blood samples are found on Table 21.

CART tags were attached to the post spawn males and female in August and they were returned to the river. Jack Siple of the Kootenai Tribal Hatchery in Idaho was at the station to assist the Missouri River Fish and Wildlife Management Office with attaching the transmitters. The units were wired through the dorsal fin. The procedure has worked well on the white sturgeon and was felt to be much less evasive to the fish.

Miles City Spawning

Spawning at Miles City was initiated on Monday, June 30th with both males and females injected at 4:00 pm. The resolving dose was given at 8:00 am the following morning.

The males at Garrison Dam NFH that were selected to be used at Miles City SFH were injected on June 30th at 9:30 am. The fish were injected at a 0.2 mg/kg rate with a single dose. Male #'s 132157621A and 220E5F6E26 were selected to be crossed with female # 586A. Males 115675486A and 220E4E4E5D were selected to cross with female 4855. Both males 4E5D and 486A were used to produce family lots at Garrison with limited results. Milt quality of male 4E5D was questionable. The milt was 70-80% motile for a very short time <20 seconds, then droped off quickly. Two other males were injected to replace those that did not produce viable milt. The first #7F7D372A6B produced a small family lot at Garrison NFH. The second 132313521A produced an even smaller family lot - this male was injected later in the day at 3:00 pm. Monte from the Miles City SFH flew up to pick up the sperm and deliver milt for cryopreservation. At the time of spawning milt from three of the six males available was used to produce progeny at Miles City creating two 1 X 3 family crosses.

Ovulation of the two known females went well at Miles City. They were also surprised by a small 28 pound suspect male producing viable eggs. At capture the protocol has been to catheterize only the fish that appeared gravid. After this season, it appears that we should consider checking all fish for the presence of eggs. After 'finding' the additional female, the fish was given a resolving dose of LH-RH to further the ovulation process.

A total of 2957mls (118,320) of eggs were collected from female #132256586A and crossed with three males. The second female #7F7F054855, (a previously spawned female) produced

1213 mls (48,520) of eggs and was also crossed with three males. Only 25 mls (1000)of eggs were collected from the 'surprise' female. Eggs from this fish were not easily expressed and it was thought at the time they were likely not ready.

July 3rd eggs and milt were transported by hatchery truck from Miles City to Garrison Dam NFH and Bozeman FTC. 100 mls of eggs were shipped from each of five families, and 200 mls from the larger family lot (486A X 552A) to Garrison (Table 5). Eggs were treated with Betadine upon arrival - 100 ppm, 10 minute bath. The Miles City eggs hatched on July 6-7. The six week survival of eggs from the Miles City families at Garrison averaged 32.2%, much higher than at either Bozeman or Miles City (Table 8). Apparently there was little effect from the shipment.

Table 1. Pallid Broodstock Data.

2003 PALLID STURGEON BROODSTOCK DATA								
Tag Number	**Date**	**Sex**	**Wt lbs.**	**2nd Tag Number**	**Other Info**	**Spawn results**		**Spawn Site**
						Cryo	**Progeny**	
44426F185B	5/14/03	F	53	7F7B016070	Spaghetti tag ES 10027 (can't read 2nd pit tag)	-	yes	GAD
220E4E4E5D	5/6/03	M	35		One eye, recap	no	no	GAD
132157621A	5/6/03	M	35		new fish, cath - no eggs, Tagged at hatchery	yes (5%)	yes	GAD
7F7D372A6B	5/6/03	M	32		cath - no eggs	yes (20%)	no	GAD
132313521A	4/30/03	M	40		new fish	yes (5%)	yes	GAD
41475D3C5D	4/30/03	M		757D365422	4148382A26-Spawned in '97 @ GAD	no	yes	GAD
1F521B1E56	4/30/03	M	33	1F54696C38	recap 9/29/1995	yes (2%)	yes	GAD
1F4A13592B	4/25/03	M	36.5	220D4E6A57		yes (35%)	yes	GAD
7F7D291A07	4/24/03	M	38.5		Spawned in '97 (155 progeny released in RPA #2)	yes (20%)	yes	GAD
115676694A	4/24/03	F	30		new fish, died post spawn, progeny died	-	no- died	GAD
1F4A363031	4/23/03	M	45		Spawned in '98 (100 progeny released in RPA #2)	yes (50%)	yes	GAD
115675486A	4/23/03	M	27	A98R7RGKJ		yes (50%)	yes	GAD
7F7B026102	4/23/03	F	44		CATH - EGGS	-	no	GAD
220E5F6E26	4/23/03	?	56		CATH - NO EGGS (possible immature female)	no milt	no	GAD
115679394A	5/5/03	F	28		new fish	-	no	MC
7F7F054855	5/5/03	F	39		Spawned at GAD in 1999	-	yes	MC
132256586A	4/29/03	F	59		new fish, CATH - EGGS	-	yes	MC

1F47760123	4/29/03	M	33		Spawned in '98 (100 progeny released in RPA #2)	yes (2%)	yes	MC
7F7F065A4E	4/22/03	M	46		cath - no eggs - old radio tag - 1992, died pre spawn	-	no-died	MC
115669540A	4/22/03	M	32		Unknown recap from 2001	yes (<1%)	yes	MC
132114552A	4/22/03	M	24		new fish	yes(1%)	yes	MC

Table 2. Female #44426F185B (7F7B016070) - Spawning Results

FEMALE #44426F185B (7F7B016070)									
TIME	**DATE**	**MALE #**	**MLS EGGS**	**# EGGS @ 36.5/ML**	**Percent Fertilization (based on hatch)**	**Estimated Hatch Number (7/1/03)**	**Eggs to Bozeman @ 36.5/ML**	**Estimated Number (7/25/03)**	**Initial Survival**
11:50 a	6/25	41475D3C5D	400	14600	55%	6000	3650	2200	20%
12:50 p	6/25	1F521B1E56	400	14600	37%	8900	5475	4700	20%
1:35 p	6/25	1F4A363031	425	15513	19%	4560	5475	500	2%
2:26 p	6/25	1F521B1E56	410	14965					
3:37 p	6/25	7F7D291A07	500	18250	25%	4500	0	1900	10%
3:37 p	6/25	1F4A363031	400	14600					
4:35 p	6/25	132313521A	550	20075	29%	4500	5475	25	0%
5:40 p	6/25	7F7D372A6B	300	10950	2%	150	9125	0	0%
6:40 p	6/25	1F4A13592B	375	13688	7%	1500	5475	150	1%
11:05 p	6/25	1F4A13592B	375	13688					
7:25 a	6/26	7F7D372A6B	175	6388					
TOTAL			4310	157352	25%	30110	34675	9475	8%

Table 3. Female #7F7B026102 - Spawning Results

FEMALE #7F7B026102								
TIME	**DATE**	**MALE #**	**MLS EGGS**	**# EGGS @ 36.5/ML**	**Percent Fertilization**	**Estimated Hatch Number**	**Milt time**	**Comments**
2:45 p	6/25	1F4A13592B	0.1	4	0.0	0	2:24 p	
5:32 p	6/25	7F7D372A6B	0.05	0	0.0	0	2:05 p	
8:38 p	6/25	1F4A13592B	100	3650	0.0	0	2:24 p	
11:00 p	6/25	7F7D291A07	150	5475	0.0	0	10:55 p	
12:02 a	6/26	1F4A13592B	10	365	0.0	0	12:02 a	
12:30 a	6/26	1F4A13592B	5	183	0.0	0	12:02 a	
3:15 a	6/26	7F7D291A07	5	183	0.0	0	10:55 p	
TOTAL			270.15	9895	0.0	0		no hatch

Table 4. Female #115676694A - Spawning Results

FEMALE #115676694A									
TIME	**DATE**	**MALE #**	**MLS EGGS**	**# EGGS @ 36.5/ML**	**Percent Fertilization (based on hatch)**	**Estimated Hatch Number (7/1/03)**	**Eggs to Bozeman @ 36.5/ML**	**Estimated Number (7/21/03)**	**Initial Survival**
11:30	6/25	41475D3C5D	1	37	0%	0	0	0	0%
2:30	6/25	7F7D372A6B	7	256	3%	200	1825	6	0%
5:40	6/25	7F7D372A6B	1	37					
8:38	6/25	7F7D372A6B	3	110					
11:05	6/25	7F7D372A6B	3	110					
12:04	6/26	7F7D372A6B	3	110					
3:10	6/26	7F7D372A6B	6	219					
7:20	6/26	7F7D372A6B	40	1460					
10:45	6/26	7F7D372A6B	92	3358					
12:45	6/26	7F7D372A6B	30	1095					
2:35	6/26	7F7D372A6B	38	1387					
3:10	6/26	132313521A	137	5001	1%	45	1825	2	0%
4:04	6/26	132313521A	80	2920					
4:30	6/26	115675486A	80	2920	0%	6	1825	0	0%
4:55	6/26	115675486A	98	3577					
5:20	6/26	220E4E4E5D	98	3577	0%	3	1825	0	0%
10:15	6/26	220E4E4E5D	325	11863					
TOTAL			1041	38033	1%	254	7300	6	0%

Table 5. Miles City Spawning Results

Miles City Spawning Results									
Female #	**Male #**	**Eggs mls**	**# Eggs @40/ml**	**Percent Fertilization (based on hatch)**	**Estimated Hatch Number**	**Eggs to Bozeman FTC**	**Eggs to Garrison Dam NFH**	**Estimated Number @ MCSFH (8/15/2003)**	**Initial Survival**
132256586A	132114552A	1360	54400			4000	8000	800	
132256586A	13157621A	828	33120			4000	4000	350	
132256586A	1F47760123	769	30760			4000	4000	0	
7F7F054855	115669540A	444	17760			4000	4000	2200	
7F7F054855	115675486A	414	16560			4000	4000	950	
7F7F054855	132313521A	355	14200			4000	4000	0	
115679394A	1F47760123		40			1000	0	0	
TOTAL		2810	112400	0%	0	25000	28000	1150	0%

2003 Progeny Propagation Efforts

Tank screens were changed out and feeding was initiated at ten days post hatch using BioOregon's BioDiet Starter #1. The feeders were set to feed at 15 minute intervals 24/7. The 'Garrison' fish are feeding well by July 27th and mortalities have dropped off significantly. The fish appear ready for the next diet size and mixing of the Starter #2 began. The volume of feed is increased from 100 mls to 150-200 mls/day. Some of the 'Miles City' fish have elevated mortalities and a fair number of 'pin-heads.' In the tanks with 'pin-heads', the fish are swimming at the surface and appear to have scoliosis. We are feeding bloodworms and brine shrimp as well as Biodiet to get them started feeding. On July 29th a group of 'spinners'(586A X 621A) are moved to a separate tank. The fish were held separate to evaluate their survival. Fifteen days later the 'spinners' have returned to normal, taking a position on the tank bottom similar to the rest of the lots. Mortality it the tank was typical.

By August 6th the fish are moved to the larger production tanks at a rate of 375 fish per five foot tank and 260 fish per four foot tank. A mixture of Starter #2 and #3 at 200 mls/day is begun. On the 14th, BioDiet grower is mixed with the #3 to transition the fish up a level. Feeding rates were dropped to 100-120 mls/day.

September 1st, the fish are again needing to have density's reduced. Sample counts for the 'Garrison' fish average 1.9 grams/fish. The 'Miles City' fish are at 1.6 grams. All tanks in the hatchery including most of the 30 inch tanks are full to capacity.

September 3rd mortality begins in the green eight foot tank. On the 5th fish are moved to another building to reduce the density. The mortality explodes over the next few weeks. CLT is used in a 5ppm flow through treatment targeting any bacterial problems they may have. The rate was increased to 10 ppm for the next two treatments without effect.

September 5th, switched to feeding the Silver Cup Salmon #2 feed at about 10% BW. On the 19th the average size of the fish is 6.5 grams - feed rate dropped to 7%. There has been a rise in mortalities in three other tanks by the 25th. The diet is now a mixture of S.C. Salmon #2 and #3.

The 3rd of October we started on straight #3. Arrangements were made to stock fish that had not experienced mortality and Bozeman FHC was here for an inspection.

Fish for Gavins Point future broodstock as well as 2003 propagation efforts were hauled to Gavins Point on the 6th of October at an average size of 5 inches. Four family groups were hauled at 650 fish per compartment (up to 22.2 lbs/cmpt). The fish were shipped at 68E and were off loaded at Gavins Point at 63E F. Eleven boxes were also taken with representatives of smaller family groups. The fish in boxes were shipped with up to 17 fish per box. The nets used to package the fish were dipped in a Hyamine solution for disinfection. Apparently there was enough residual Hyamine on the nets during the transfer to cause mortality in the shipping boxes. Although seven boxes made it in great shape with no mortality, four of the boxes suffered 100% mortality and 57 fish died. You can be too safe! The same day 133 of the 2002 progeny 'runts' were hauled 575 miles to Mulberry Bend and stocked. These fish averaged ten inches and weighed 21.5 pounds. On the 15th of October an additional 1600 six inch fish weighing 52

pounds were sent to Yankton. The tanks were loaded with 400 fish each from four family lots (Table 16). On the 30th of October the Neosho crew hauled 3,919 seven inch fish back to their facility (Table 17). The fish were loaded in a 3 compartment tank, ~250 gallons/compartment. A total of 203.1 pounds were loaded on the truck. There was some difficulty with the oxygen in the center tank that resulted in mortality during the haul. The inventory taken on December 1 at Neosho indicated that they had lost 377 fish over the month of November.

October 31st a group was assembled to tag the 2003 progeny prior to the Fall release. A coded wire tag (CWT) and pink elastomer was used to mark the fish. The elastomer was injected in the right side of the rostrum and parallel to the fish and the tag under the second dorsal scute anterior to the dorsal fin. The average size of the fish is now 20.0/lb.

On November 18th the water temperature was dropped to 52E F to match water temperature at the stocking sites. Feeding was reduced to 2% body weight. November 20th the first fall fish were hauled to the stocking site at Mulberry Bend, NE (Table 13). The fish averaged eight inches now. 1680 fish weighing 84 pounds were stocked using the 200 gallon slide-in unit. Loading temperature was 49E F and the temperature at the river was 43E F. The tank had cooled to 45E during transport and fish were stocked without tempering. Only 1 mortality was noted at stocking. The final shipment of 190 fish for Gavins Point were shipped in boxes for the trip. The fish were loaded with a maximum of 16 fish per bag.

November 24th -25th we tagged an additional 3600 pallids with 3 hand-held CWT units and elastomer injectors. These fish were scheduled for stocking at Bellevue and Booneville. The water temperature was dropped again to 49E to match stocking temperatures. Post tagging mortality during the 6 days prior was 1.5%. We lost a total of 54 fish.

The final shipment of the year was taken by the Blind Pony SFH crew. On December 2nd, they braved the snow to haul 3,550 fish to their stocking sites at Bellevue, NE and Booneville, MO (Table 14 and Table 15). The truck had four 300 gallon compartments. The fish were loaded on at 38EF to match the receiving water temperature. The trip lasted 17 hours and the report back indicated that the fish hauled great and only two fish looked weak at the time of stocking.

December 3rd we distributed the remaining fish into the 36 production tanks using a maximum density 0.5 pounds per square foot at a nine inch size (Table 18). Feeding rate was dropped to 1% since there is little feeding activity in the 49E F water.

Table 6. Survival Rates - Garrison Dam Progeny at Two Months

FEMALE #44426F185B (7F7B016070)												
Time	**Date**	**Male #**	**Eggs mls**	**# Eggs @ 37/ml**	**Percent Fert. (based on hatch)**	**Estimated Hatch Number (7/1/03)**	**Hatch Number (Backcalculated from Morts)**	**Eggs to Bozeman @ 37/ML**	**Estimated Number (7/25/03)**	**Inventory Estimate 8/12/03**	**Inventory 9/1/03**	**% Survival @ 2 months**
11:50a	6/25	41475D3C5D	400	14800	45.2%	6000	5019	3700	2200	3040	2975	59.3%
12:50p	6/25	1F521B1E56	400	14800	44.5%	8900	9220	5550	4700	6000	5942	64.4%
1:35 p	6/25	1F4A363031	425	15725	10.3%	4560	2569	5550	500	620	591	23.0%
2:26 p	6/25	1F521B1E56	410	15170								
3:37 p	6/25	7F7D291A07	500	18500	26.8%	4500	4954	0	1900	2940	3112	62.8%
3:37 p	6/25	1F4A363031	400	14800								
4:35 p	6/25	132313521A	550	20350	19.6%	4500	2901	5550	25	13	14	0.5%
5:40 p	6/25	7F7D372A6B	300	11100	4.3%	150	359	9250	0	0	0	0.0%
6:40 p	6/25	1F4A13592B	375	13875	3.8%	1500	839	5550	150	100	179	21.3%
11:05p	6/25	1F4A13592B	375	13875								
7:25 a	6/26	7F7D372A6B	175	6475								
TOTAL			4310	159507	21.4%	30110	25861	35150	9475	12713	12813	42.6%

Table 7. Survival Rates - Garrison Dam Progeny at Two Months

FEMALE #115676694A										
Time	**Date**	**Male #**	**Eggs mls**	**# Eggs @ 37/ML**	**Percent Fertilization (based on hatch)**	**Estimated Hatch Number (7/1/03)**	**Hatch Number (Backcalculated from Morts)**	**Eggs to Bozeman @ 37/ML**	**Estimated Number (7/21/03)**	**Initial Survival**
11:30	6/25	41475D3C5D	1	37	0.0%	0	0	0	0	0.0%
2:30	6/25	7F7D372A6B	7	259	5.5%	200	352	1850	6	0.0%
5:40	6/25	7F7D372A6B	1	37						
8:38	6/25	7F7D372A6B	3	111						
11:05	6/25	7F7D372A6B	3	111						
12:04	6/26	7F7D372A6B	3	111						
3:10	6/26	7F7D372A6B	6	222						
7:20	6/26	7F7D372A6B	40	1480						
10:45	6/26	7F7D372A6B	92	3404						
12:45	6/26	7F7D372A6B	30	1110						
2:35	6/26	7F7D372A6B	38	1406						
3:10	6/26	132313521A	137	5069	0.4%	45	25	1850	2	0.0%
4:04	6/26	132313521A	80	2960						
4:30	6/26	115675486A	80	2960	0.4%	6	21	1850	0	0.0%
4:55	6/26	115675486A	98	3626						
5:20	6/26	220E4E4E5D	98	3626	0.1%	3	13	1850	0	0.0%
10:15	6/26	220E4E4E5D	325	12025						
TOTAL			1041	38554	1%	254		7400	6	0%

Table 8. Miles City SFH Progeny Survival Rates at Six Weeks

Miles City SFH Progeny												
Female #	**Male #**	**Total mls Eggs**	**Eggs Taken @40/ml**	**Eggs at Miles City SFH**	**Inventory Estimate 8/15/2003**	**% Survival @MC SFH**	**Eggs to Bozeman FTC**	**Inventory 8/19**	**% Survival @ BFTC**	**Eggs to Garrison Dam NFH**	**Inventory 8/12**	**% Survival @ GAD NFH**
132256586A	132114552A	1360	54400	42400	800	1.9%	4000	50	1.3%	8000	1640	20.5%
132256586A	13157621A	828	33120	25120	350	1.4%	4000	1000+	25.0%	4000	1535	38.4%
132256586A	1F47760123	769	30760	22760	0	0.0%	4000	99	2.5%	4000	2280	57.0%
Family total		2957	118320	90280	1150	1.3%	12000	1149	9.6%	16000	5455	34.1%
7F7F054855	115669540A	444	17760	9760	2200	22.5%	4000	700+	17.5%	4000	1135	28.4%
7F7F054855	115675486A	414	16560	8560	950	11.1%	4000	1300+	32.5%	4000	1995	49.9%
7F7F054855	132313521A	355	14200	6200	0	0.0%	4000	0	0.0%	4000	436	10.9%
Family total		1213	48520	24520	3150	12.8%	12000	2000	16.7%	12000	3566	29.7%
115679394A	1F47760123	25	1000	0	0	-	1000	66	6.6%	0	0	-
TOTAL		4195	167840	114800	4300	3.7%	25000	3215	12.9%	28000	9021	32.2%

Table 9. Garrison Dam NFH Progeny - Survival Summary at Two Months

Garrison Dam NFH Progeny										
Female #	**Male #**	**Total mls Eggs**	**# Eggs @37/ml**	**Hatch Number (Back calculated)**	**% Hatch**	**Eggs to Bozeman FTC**	**Eggs at Garrison Dam NFH**	**Inventory 9/1/03**	**% survival egg to 2 months**	**% survival hatch to 2 months**
44426F185B	41475D3C5D	400	14800	5019	45.2%	3700	11100	2975	26.8%	59.3%
44426F185B	1F521B1E56	810	29970	9220	44.5%	5550	20720	5942	28.7%	64.4%
44426F185B	1F4A363031	825	30525	2569	10.3%	5550	24975	591	2.4%	23.0%
44426F185B	7F7D291A07	500	18500	4954	26.8%	0	18500	3112	16.8%	62.8%
44426F185B	132313521A	550	20350	2901	19.6%	5550	14800	14	0.1%	0.5%
44426F185B	7F7D372A6B	475	17575	359	4.3%	9250	8325	0	0.0%	0.0%
44426F185B	1F4A13592B	750	27750	839	3.8%	5550	22200	179	0.8%	21.3%
TOTAL		4310	159507	25861	21.4%	35150	120620	12822	10.6%	49.6%
115676694A	7F7D372A6B	222	8214	200	3.1%	1850	6364	0	0.0%	0.0%
115676694A	132313521A	217	8029	45	0.7%	1850	6179	0	0.0%	0.0%
115676694A	115675486A	178	6586	6	0.1%	1850	4736	0	0.0%	0.0%

115676694A	220E4E4E5D	423	15651	3	0.0%	1850	13801	0	0.0%	0.0%
TOTAL		9260	342620	254	0.8%	7400	31080	0	0.0%	0.0%
132256586A	132114552A	200		4970	62.1%	4000	8000	1713	21.4%	34.5%
132256586A	13157621A	100		3684	92.1%	4000	4000	1744	43.6%	47.3%
132256586A	1F47760123	100		3619	90.5%	4000	4000	2375	59.4%	65.6%
TOTAL				12273	76.7%	12000	16000	5832	36.5%	47.5%
7F7F054855	115669540A	100		3213	80.3%	4000	4000	1337	33.4%	41.6%
7F7F054855	115675486A	100		3061	76.5%	4000	4000	2317	57.9%	75.7%
7F7F054855	132313521A	100		735	18.4%	4000	4000	432	10.8%	58.8%
TOTAL				7009	58.4%	12000	12000	4086	34.1%	58.3%
GRAND TOTAL				45397	25.3%	66550	179700	22740	12.7%	50.1%

Table 10. Bozeman FTC Progeny

Bozeman FTC Progeny								
Female #	**Male #**	**Eggs**	**Inventory 8/19/03**	**% survival**	**Inventory 10/14/03**	**% survival egg to 2 months**		
44426F185B	41475D3C5D	3700	67	1.8%	41	1.1%		
44426F185B	1F521B1E56	5550	0	0.0%	0	0.0%		
44426F185B	1F4A363031	5550	608	11.0%	540	9.7%		
44426F185B	7F7D291A07	0	0	0.0%	0	0.0%		
44426F185B	132313521A	5550	0	0.0%	0	0.0%		
44426F185B	7F7D372A6B	9250	0	0.0%	0	0.0%		
44426F185B	1F4A13592B	5550	0	0.0%	0	0.0%		
Family Total		35150	683	1.9%	591	1.7%		
115676694A	7F7D372A6B	1850	0	0.0%	0	0.0%		
115676694A	132313521A	1850	0	0.0%	0	0.0%		
115676694A	115675486A	1850	0	0.0%	0	0.0%		
115676694A	220E4E4E5D	1850	0	0.0%	0	0.0%		
Family Total		7400	0	0.0%	0	0.0%		
132256586A	132114552A	4000	50	1.3%	0	0.0%		
132256586A	13157621A	4000	1000+	25.0%	946	23.7%		
132256586A	1F47760123	4000	99	2.5%	91	2.3%		
Family total		12000	1149	9.6%	1037	8.6%		

7F7F054855	115669540A	4000	700+	17.5%	495	12.4%		
7F7F054855	115675486A	4000	1300+	32.5%	1647	41.2%		
7F7F054855	132313521A	4000	0	0.0%	0	0.0%		
Family total		12000	2000	16.7%	2142	17.9%		
115679394A	1F47760123	1000	66	6.6%	53	5.3%		
Grand Total		67550	3898	5.8%	3823	5.7%		

Table 11. 2003 Pallid Sturgeon Progeny Inventory

Facility	Female &	Male %	Date	Estimate	Date	Number	Date	Number	Transfer #
Garrison NFH	132256586A	132114552A	08/12/03	1640	10/01/03	1712	2/1/04	360	1257
Bozeman FTC	132256586A	132114552A	8/04/03	50	10/14/03	0			
Miles City SFH	132256586A	132114552A	08/15/03	800					
TOTAL				**2,490**					
Garrison NFH	132256586A	132157621A	08/12/03	1535	10/01/03	1735	2/1/04	470	1078
Bozeman FTC	132256586A	132157621A	8/04/03	400-500	10/14/03	946			
Miles City SFH	132256586A	132157621A	08/15/03	350					
TOTAL				**2,285**					
Garrison NFH	132256586A	1F47760123	08/12/03	2280	10/01/03	2371	2/1/04	336	1929
Bozeman FTC	132256586A	1F47760123	8/04/03	100	10/14/03	91			
TOTAL				**2,380**					
Bozeman FTC	115679394A	1F47760123	8/04/03	100	10/14/03	53			
TOTAL				**100**					
Garrison NFH	7F7B016070	132313521A	08/12/03	13	10/01/03	14	2/1/04	0	14
TOTAL				**13**					
Garrison NFH	7F7B016070	1F4A13592B	08/12/03	100	10/01/03	177	2/1/04	94	50
TOTAL				**100**					
Bozeman FTC	7F7B016070	1F4A363031	8/04/03	300	10/14/03	540			
Garrison NFH	7F7B016070	1F4A363031	08/12/03	620	10/01/03	589	2/1/04	249	285

TOTAL				**920**					
Garrison NFH	7F7B016070	1F521B1E56	08/12/03	5999	10/01/03	3037	2/1/04	226	2111
TOTAL				**5,999**					
Bozeman FTC	7F7B016070	41475D3C5D	8/04/03	50	10/14/03	41			
Garrison NFH	7F7B016070	41475D3C5D	08/12/03	3040	10/01/03	1937	2/1/04	706	1146
TOTAL				**3,090**					
Garrison NFH	7F7B016070	7F7D291A07	08/12/03	2940	10/01/03	3107	2/1/04	194	2653
TOTAL				**2,940**					
Garrison NFH	7F7F054855	115669540A	08/12/03	1135	10/01/03	1193	2/1/04	407	910
Bozeman FTC	7F7F054855	115669540A	8/04/03	300-400	10/14/03	495			
Miles City	7F7F054855	115669540A	08/15/03	2200					
TOTAL				**3,635**					
Bozeman FTC	7F7F054855	115675486A	8/04/03	1000+	10/14/03	1647			
Garrison NFH	7F7F054855	115675486A	08/12/03	1995	10/01/03	2309	2/1/04	351	1846
Miles City SFH	7F7F054855	115675486A	08/15/03	950					
TOTAL				**3,945**					
Garrison NFH	7F7F054855	132313521A	08/12/03	436	10/01/03	429	2/1/04	241	107
TOTAL				**436**					

2002 Progeny Propagation Efforts

Mid January the water temperature was needing to be lowered to accommodate other fish requests on station. Prior to dropping the temperature we removed what we considered 'runt' fish from the production tanks and consolidated them in the 30 inch fry tanks. We would be able to provide that bank of tanks with warmer water through the winter to hopefully allow the fish to catch up with the others and be stocked the following Spring. A total of 779 fish were moved. Following the move, the production tanks were dropped about 5 degrees per day to get them from 55E F to 33E F. Feeding was also stopped with the drop in temperatures. Water temperatures in the 'runt' tanks was maintained at about 60E F - mortality spiked immediately after the move. Nitrogen supersaturation was suspected and confirmed at 110%. In keeping heated water to that bank of tanks we had to bypass the degassing units. Individual packed columns were added to each of the heated tanks and mortalities were reduced significantly. Dead fish were sent to Bozeman to evaluate - the results showed the fish iridovirus positive. To determine how significant the nitrogen was in causing mortalities we moved age 1+ shovelnose to tanks with the untreated heated water, they also died - gas bubbles present in the gill lamellae.

Mid February mortalities are on the rise in our production tanks. Two tanks suspected as virus positive are tempered up to 40E F to see what effect the warmer temperatures would have on the virus. The results indicated that warming the temperature likely allows the virus to replicate faster and mortality in those two tanks (10% and 27%) were higher that those left at 33EF (>6%). In spite of the virus outbreaks in about a dozen tanks, survival rates for February, March and April averaged 96%, 97% and 99% per month. Although the virus has the potential to cause high mortality levels, by maintaining good fish culture practices, we are able to minimize the effects (even at 33EF). An interesting note, a dark patch has shown up under the eyes of some of the suspected virus positive fish - 'coon eyes'. Fish from virus positive tanks were sent to UC Davis to aid in development of the PRC test.

April 2nd, Bozeman FTC personnel were on station taking 100 samples for the UC Davis PRC analysis verification. May 15th personnel were back conducting the pre-release assessment on a 60 fish sample, 2 fish per tank. May 20th the temperature in the pallid tanks was increased to nearly 50E F and feeding was initiated at about 1-2 % BW using a #3 Silver Cup Trout Crumble. Fish appear to be feeding well. The fish had been off feed and on 33EF water temperatures for 4 months. With the exception of five tanks that exhibited signs of the virus, fish in the remaining 23 tanks appear in good condition with no mortality for the month.

June 4th the water supply was switched from the Salmon Building to the Main and water temperature is 60EF. The effects of the virus have begun in a half dozen tanks with fish acting irritated, swimming apathetically around in the tanks.

Summer Stockings for RPA #4

Tagging for the RPA #4 stockings started July 14th and were completed the next day. Four crews of 4-5 were set up, one to enter data, one to measure length/weight, one to tag, one to load the tags and one to shuttle fish. Each fish was measured and injected with a pit tag into the base of the dorsal fin. The process took about 10 hours for 5295 fish tagged (Table 12). Water temperature at tagging was 68EF. No mortalities were noted. The following morning the fish were loaded into the distribution trailer headed for Mulberry Bend, NE - the heaviest tank had 89 pounds (Table 13). Oxygen was used to maintain the DO level around 11 ppm. Tank temperature was 68E F. and temperature at the stock site was 78E F. Tempering was done over a period of an hour to 76EF. At about 10:00 pm on the evening of the 15th the load destined for Booneville, Missouri left in Gavins Point's distribution truck. The driver was changed out at Yankton the following morning and fish stocked after being in transit 18 hours. Not a single dead fish was noted (Table 14). The last of the tagged 2002 class went out on the morning of the 16th headed for Bellevue, NE (Table 15). They were hauled in the Garrison Dam distribution tank to the site a distance of 700 miles. The fish arrived at the site at 72EF. The water in the river was 82EF. Tempering was done at the boat ramp for 45 minutes to acclimate the fish. We held on to 162 fish (3%) of the 2002 year class that were either sick, or to small to PIT tag. These fish were be grown out over the Summer for a Fall stocking at Mulberry Bend, NE. On October 5th, the remaining 2002 'runts' are pit tagged and shipped the following morning to the Mulberry Bend stock site. A total of 133 fish were stocked. A summary of the 2002 progeny stockings.

2002 Progeny - RPMA #4 Stockings								Total	
Female	Male	Mulberry, NE		Bellevue, NE		Booneville, MO		Fish Stocked	
		Number	Weight	Number	Weight	Number	Weight	Number	Weight
116224546A	1F477B3A65	578	64.2	500	70.2	245	36.9	1901	171.3
116224546A	116167123A	520	88.8	500	80.9	399	68.1	1939	237.8
116224546A	220F107A6F	575	89.0	556	89.6	470	75.0	2176	253.6
116224546A	7F7D461025	396	65.8	382	69.1	326	50.9	1500	185.8
		2069	307.8	1938	309.8	1440	230.9	7516	2917.5

Side Notes

A pallid sturgeon from the 1992 spawn at Blind Pony SFH held in a 400 gallon aquarium at Garrison Dam NFH for the past 7 years (previously held at Gavins Point) died the first of September. The fish weighed 1676 grams (3.7 pounds) and was full of jet black eggs. The ovaries weighed 243 grams gonadosomatic index(GSI) of 14.5%. The polarity index of the eggs indicated that the eggs were fully developed and ready for spawn. Apparently even under not so ideal conditions, some pallid females are sexually mature in 10 years and at less than 4 pounds!

A pallid sturgeon hybrid died on September 3rd and it was also gravid. This fish weighed 14.2 pounds and it's ovarian weight was 773 grams (1.7 pounds). The GSI for this fish was 12.0%. A subsample of eggs and ovarian tissue was taken, weighed and counted. The sample's weight was 18 grams and there were 1251 fully developed eggs counted. This amounted to 69.5 eggs per gram including ovarian tissue. Egg size without tissue was 83.4eggs/gram. The fecundity of this fish was 53,724 eggs.

A pallid from Garrison Dam NFH stocked in RPA #4 at Bellevue, Nebraska in April 2002 at 174 mm FL was recaptured this Spring. The length at capture was 350 mm - 6.9 inches of growth.

In July 2003, MFWP personnel collected 21 of the 2001 progeny. Garrison Dam NFH had stocked 1626 of the 2001 progeny at 5 sites in RPA #2 on July 25th of 2002. Garrison's fish were marked with a single green elastomer and PIT tag. Fifteen of the twenty-one fish sampled were from Garrison Dam NFH (three had lost the elastomer). Six fish were from Miles City SFH (1277 stocked). The average growth of the recaptured fish was 2 inches in the year spent at large. The range was 0.5 - 3.4 inches. Five more hatchery reared pallid sturgeon were sampled in August, two in September, and two in October for a total of 30 sampled. Three of the last four fish sampled were caught on a setline with nightcrawler. Two of the three caught were from Garrison's 2001 progeny. They had grown to twelve and a half inches FL. One of the October fish sampled from Garrison was stocked at Intake, moved down the Yellowstone 70 miles and back up the Missouri 62 miles where it was sampled. The fish had grown 3 inches in the 14 months at large. These fish had undergone the same culture conditions as the past two year classes. These fish were the lot that received multiple formalin treatments for the amoeba and costia parasites. They made it through the Winter months without feed and at 33E F.

In RPA #1 there were 32 hatchery progeny recaptured this year, 29 from the 1997 stocking and 3 from the 2001 stocking. To date there have been 57 individual pallid sturgeon recaptured of the 750 stocked in the 1997 stocking - 7.6% of the total stocked number.

In RPA #3 seventy-two hatchery progeny were recaptured. Condition factors were calculated from the collected fish to determine by year class how the fish were faring. The 2001 year class had a condition factor of 0.9, the best of the five year classes. Garrison Dam progeny made up the 2001 class in RPA #3. Although the data from hatchery stockings is fairly sketchy, what information we have collected indicates that the hatchery progeny are acclimating to their natural environments, they appear to be foraging sufficiently and don't appear to have any short term ill effects from hatchery propagation.

Four males were injected August 4th@ the 0.02 mg/kg rate with LH-RH to obtain milt for cryopreservation. The four were 4E5D, 521A, 1E56, and 621A. None of the fish responded to the injections. Water temperature in the tank was 60 EF. All four fish had been given injections in June for milt collections as well and did produce viable sperm. Previously we sampled gonadal tissue during Fall collections and were able to activate sperm cells at that time. The question was raised as to whether viable milt could be obtained at any time during the year. It appears that there is a post spawn period where spermiation can not be initiated by hormonal injections of LH-RH. It would be interesting to experiment further on shovelnose collected in the Fall to see if spermiation can be induced.

We have results from age samples on seven adults. The ages of the fish when corrected to 2003 indicate that they were from a spawn event 36-63 years ago. The ages of the fish are all between 31 and 55.

When comparing the Coefficient of Condition, K, between Gavins Point NFH, Miles City SFH, and Garrison Dam NFH, Garrison's fish tended to be the least robust. The median K X 10 value for Garrison was 3.33, Gavins Point - 3.96 and Miles City - 3.67. An interesting observation considering Garrison's fish have consistently had higher liver lipid levels.

Diagnostic blood analysis was performed on five broodstock pallids post spawn to document values in stressed fish and attempt to identify what is ultimately causing mortality in the post spawn fish. Blood values from the two female would be representative of a critically stressed fish. Those from the males would be considered from the typical post spawn stressors (Table 21) . From the 2004 broodstock collections we hope to collect blood samples at capture to give us an indication of what 'normal' values are for this fish. If a pattern can be identified using blood values early enough, wh are hoping actions may be taken to alleviate the problem. Gary Marty, DMV from UC Davis was consulted to evaluate the cause of death in female #694A. He was also asked to consider addressing the problems of post spawn mortality. He indicated that the project would require several years worth of data to identify significant trends and that he was not aware of any methods of monitoring the health of individual broodstock sturgeon. He was willing to take on the project if funding could be found.

Submitted a Science Support Partnership (SSP) joint study proposal titled "Development of clinical tests to evaluate fatty liver disease in pallid sturgeon." The investigator for the project would be the USGS/BRD Upper Midwest Environmental Sciences Center, Mark Gaikowski, Research Physiologist. The original project was 'to evaluate the effect of fatty livers on pallid sturgeon survival,' but the investigator felt that it was necessary first to determine what effect the histological diagnosis of a fatty liver condition had on the actual liver function. The proposal would develop clinical liver function tests (clearance and enzyme levels) as the first step in the evaluation of artificial and natural diets. The outcome of the study would correlate pallid liver function with tissue pathology. The study was not funded.

Preserved egg samples from past years' polarity index evaluations were sent to Molly Webb at Oregon State University. The egg samples will be examined histologically to determine if there were any changes between the time of capture and spawning. What we are hoping to develop a

method of evaluating eggs that relates to the likelihood of spawning success. If specific changes are observed that correspond to unsuccessful spawning , we could opt to not induce ovulation to avoid further stress in females that have already aborted their eggs.

Table 12. Tagging for RPA #4 - November 25, 2003

Female	Male	Tank	Number	Weight (lbs)	#/lb
44426F185B	7F7D291A07	56	193	12.2	15.8
(7B7B016070)	7F7D291A07	81	76	4.9	15.5
	7F7D291A07	65	45	2.4	18.8
	7F7D291A07	N8	906	42.9	21.1
	1F521B1E56	R1	639	11.3	56.5
	1F521B1E56	G8	192	7.0	27.4
	41475D3C5D	58	274	13.8	19.9
	41475D3C5D	74	86	2.9	29.7
TOTAL			2411	97.4	24.8
7F7F054855	115669540A	52	102	2.9	35.2
	115669540A	77	45	1.2	37.5
	115675486A	76	123	8.0	15.4
	115675486A	6	17	0.8	21.3
	115675486A	9	76	5.2	14.6
TOTAL			363	18.1	20.1
132256586A	132114552A	66	101	7.8	12.9
	132157621A	72	64	4.3	14.9
	132157621A	62	110	7.6	14.5
	1F47760123	71	76	4.6	16.5
	1F47760123	83	211	14.3	14.8
	1F47760123	1	74	6.1	12.1
	1F47760123	2	75	4.3	17.4
	1F47760123	54	97	6.0	16.2
	1F47760123	63	22	0.9	24.4
TOTAL			830	55.9	14.8
GRAND TOTAL			3604	171.4	21.0

Table 13. Mulberry Bend Stocking, November 3, 2003.

Female	Male	Tank	Number	Weight (lbs)	#/lb
44426F185B	7F7D291A07	65	68	3.7	18.4
(7B7B016070)	7F7D291A07	67	248	15.8	15.7
	7F7D291A07	N 8	272	11.6	23.4
	1F521B1E56	G 8	246	7.4	33.2
	1F521B1E56	R 1	189	4.7	40.2
	41475D3C5D	S 8	184	8.4	21.9
TOTAL			1207	51.6	23.4
7F7F054855	115675486A	FT 4	86	5.4	15.9
TOTAL			86	5.4	15.9
132256586A	1F47760123	63	35	1.8	19.4
	1F47760123	FT 29	98	6.9	14.2
	1F47760123	FT 30	149	11.2	13.3
	132114552A	59	56	3.5	16.0
	132114552A	66	6	0.3	20.0
	132157621A	50	36	1.8	20.0
	132157621A	62	90	4.6	19.6
TOTAL			470	30.1	15.6
GRAND TOTAL			1763	87.1	20.2

Table 14. Booneville MO Stocking, December 2, 2003.

Female	Male	Tank	Number	Weight (lbs)	#/lb
44426F185B	7F7D291A07	61	294	15.1	19.5
(7B7B016070)	7F7D291A07	73	291	14.9	19.5
	1F521B1E56	56	415	9.1	45.4
	41475D3C5D	G8	180	10.8	16.7
TOTAL			1180	49.9	23.6
7F7F054855	115669540A	G8	73	2.0	35.9
	115675486A	G8	108	7.0	15.4
TOTAL			181	9.0	20.0
132256586A	132114552A	2	51	4.0	12.9
	132157621A 1F47760123	66	357	23.8	15.0
TOTAL			408	27.8	14.7
GRAND TOTAL			1769	86.7	20.4

Table 15. Bellevue NE Stocking, December 2, 2003.

Female	Male	Tank	Number	Weight (lbs)	#/lb
44426F185B	7F7D291A07	60	303	15.5	19.5
(7B7B016070)	7F7D291A07	78	294	15.1	19.5
	1F521B1E56	N8	415	9.1	45.4
	41475D3C5D	71	180	10.8	16.7
TOTAL			1192	50.5	23.6
7F7F054855	115669540A	83	72	2.0	35.9
	115675486A	81	108	7.0	15.4
TOTAL			180	9.0	20.0
`					
132256586A	132114552A	1	50	3.9	12.9
	132157621A 1F47760123	51	359	23.9	15.0
TOTAL			409	27.8	14.7
GRAND TOTAL			1781	87.4	20.4

Table 16. Gavins Point NFH Pallid Transfers

Female	Male	Tank	Number	Weight (lbs)	#/lb	Date
44426F185B	7F7D291A07	N8	400	9.4	42.6	10/15
(7B7B016070)	1F521B1E56	55	51	0.8	63.8	10/6
	1F521B1E56	61	351	11.4	30.8	10/6
	1F521B1E56	68	248	6.4	38.8	10/6
	41475D3C5D	69	43	0	0.0	10/15
	41475D3C5D	78	357	12.2	29.3	10/15
	1F4A363031	79	17	0	0.0	10/6
	1F4A363031	79	16	0	0.0	11/20
	1F4A363031	71	17	0	0.0	10/6
	1F4A13592B	19	17	0	0.0	10/6
	1F4A13592B	26	17	0	0.0	10/6
	1F4A13592B	26	16	0	0.0	11/20
	132313521A	25	14	0	0.0	10/6
TOTAL			1564	40.2	36.6	
7F7F054855	115669540A	60	370	4.0	92.5	10/6
	115669540A	77	30	1.1	27.3	10/6
	115669540A	7	125	1.4	89.3	10/6
	115669540A	18	125	1.4	89.3	10/6
	115675486A	6	90	0	0.0	10/15
	115675486A	8	155	0	0.0	10/15
	115675486A	9	155	0	0.0	10/15
	132313521A	70	17	0	0.0	10/6
	132313521A	70	57	0	0.0	11/20
	132313521A	80	17	0	0.0	11/20
	132313521A	80	16	0	0.0	10/6
TOTAL			1157	7.9	91.6	

132256586A	1F47760123	2	150	5.2	28.8	10/6
	1F47760123	24	150	5.5	27.3	10/6
	1F47760123	27	150	4.0	37.5	10/6
	1F47760123	28	148	5.4	27.4	10/6
	1F47760123	29	52	2.1	24.8	10/6
	132114552A	75	61	2.2	27.7	10/6
	132114552A	12	139	3.4	40.9	10/6
	132114552A	13	150	5.2	28.8	10/6
	132114552A	14	150	4.6	32.6	10/6
	132114552A	15	150	4.6	32.6	10/6
	132157621A	10	158	0	0.0	10/15
	132157621A	11	158	0	0.0	10/15
	132157621A	23	9	0	0.0	11/20
	132157621A	20	75	0	0.0	11/20
TOTAL			1700	42.2	34.8	
115676694A	mix	23	4	0	0.0	10/6
GRAND TOTAL			4425	90.3	36.6	

Table 17. Neosho NFH Pallid Transfers - October 30, 2003.

Female	Male	Tank	Number	Weight (lbs)	#/lb
44426F185B	7F7D291A07	56	86	4.8	17.9
(7B7B016070)	7F7D291A07	51	359	18.3	19.6
(front tank)	1F521B1E56	57	145	7.3	19.9
	1F521B1E56	55	300	12.5	24.0
	41475D3C5D	69	202	11.9	17.0
	1F4A363031	71	235	10.6	22.2
TOTAL			1327	65.4	20.3
7F7F054855	115669540A	52	113	2.8	40.4
(middle tank)	115675486A	53	246	10.6	23.2
	115675486A	76	127	6.6	19.2
	115675486A	4	49	2.7	18.1
	115675486A	73	373	21.6	17.3
	115675486A	81	269	15.4	17.5
	115675486A	3	77	4.2	18.3
TOTAL			1254	63.9	19.6
132256586A	1F47760123	63	194	9.2	21.1
(rear tank)	1F47760123	64	251	14.0	17.9
	132114552A	66	250	15.3	16.3
	132114552A	75	195	10.2	19.1
	132157621A	62	32	1.2	26.7
	132157621A	72	255	14.1	18.1
	132157621A	21	158	9.8	16.1
TOTAL			1335	73.8	18.1
GRAND TOTAL			3916	203.1	19.3

Table 18. Pre-winter Tank Distribution

Female &	Male %	Source	#'s	pounds of 7" fish	pounds of 8" fish	pounds of 9" fish	# of Tanks			Density of 7 inch fish	Density of 8 inch fish	Density of 9 inch fish
							4'	5'	8'			
132256586A	132114552A	MCSFH	393	18.7	28.1	39.3	1	3	0	0.2621	0.39316	0.55042
132256586A	132157621A	MCSFH	478	22.8	34.1	47.8	0	5	0	0.232264	0.3484	0.487755
132256586A	1F47760123	MCSFH	391	18.6	27.9	39.1	1	3	0	0.260771	0.39116	0.547619
7F7B016070	1F4A363031	GDNFH	255	12.1	18.2	25.5	2	1	0	0.271046	0.40657	0.569196
7F7B016070	1F521B1E56	GDNFH	228	10.9	16.3	22.8	0	0	1	0.216278	0.32442	0.454183
7F7B016070	41475D3C5D	GDNFH	709	33.8	50.6	70.9	1	3	1	0.277647	0.41647	0.583059
7F7B016070	7F7D291A07	GDNFH	203	9.7	14.5	20.3	1	1	0	0.300207	0.45031	0.630435
7F7B016070	1F4A13592B	GDNFH	100	4.8	7.1	10.0	0	1	0	0.242954	0.36443	0.510204
7F7F054855	115669540A	MCSFH	428	20.4	30.6	42.8	1	3	0	0.285448	0.42817	0.59944
7F7F054855	115675486A	MCSFH	411	19.6	29.4	41.1	1	3	0	0.27411	0.41116	0.57563
7F7F054855	132313521A	MCSFH	253	12.0	18.1	25.3	2	1	0	0.26892	0.40338	0.564732
			3849	183.3	274.9	384.9	10	24	2	0.263039	0.39456	0.552382

Table 19. Milt Collections 2003

Milt Collections 2003						
Tag Number	Collection Time	Date	Milt Quantity (mls)	Motility	Vitality	Comments
1F4A363031	11:00 am	6/25/03	60	50%		26 mls to WS
132313521A	11:00 am	6/25/03	60	70%		26 mls to WS
7F7D372A6B	11:00 am	6/25/03	60	60%		26 mls to WS
1F521B1E56	11:00 am	6/25/03	60	60%		26 mls to WS
1F4A13592B	11:00 am	6/25/03	35	60%		24 mls to WS
41475D3C5D	11:00 am	6/25/03	60	< 1%		26 mls to WS
7F7D291A07	11:00 am	6/25/03	60	50%		26 mls to WS
41475D3C5D	11:35 am	6/25/03	60	<5%		
1F521B1E56	11:45 am	6/25/03	65			
7F7D291A07	11:45 am	6/25/03	37	45%	2	
1F4A363031	1:35 pm	6/25/03	65			
1F4A13592B	2:24 pm	6/25/03	60			
41475D3C5D	2:10 pm	6/25/03	65	< 1%		
132313521A	2:15 pm	6/25/03	65			
7F7D372A6B	2:05 pm	6/25/03	65	50%	2+	
7F7D372A6B	10:50 pm	6/25/03	65	60%	3	

7F7D291A07	10:55 pm	6/25/03	65	50%	2+	
1F521B1E56	10:53 pm	6/25/03	65			
132313521A	10:55 pm	6/25/03	65			
7F7D291A07	11:57 pm	6/25/03	36			
1F4A363031	12:00 m	6/25/03	65			
1F4A13592B	12:02 am	6/26/03	65			
220E4E4E5D	7:12 am	6/26/03	65			
115675486A	7:16 am	6/26/03	65			
7F7D372A6B	10:32 am	6/26/03	65			
132313521A	2:30 pm	6/26/03	65			
220E4E4E5D	4:01 pm	6/26/03	60			
220E4E4E5D	10:13 pm	6/26/03	65			
132157621A	10:00 am	7/1/03	65	95%		for Miles City
220E5F6E26	10:00 am	7/1/03	-	didn't produce		for Miles City
220E4E4E5D	10:00 am	7/1/03	-	poor quality		for Miles City
115675486A	10:00 am	7/1/03	65	good		for Miles City
132157621A	11:30 am	7/1/03	65	good		for Miles City
115675486A	11:30 am	7/1/03	65	good		for Miles City
7F7D372A6B	11:30 am	7/1/03	65	good		for Miles City
132313521A	11:30 am	7/1/03	65	good		for Miles City

Table 20. Milt Cryopreservation

2003 PALLID STURGEON CRYOPRESERVATION DATA SHEET														
Tag Number	**Spawn Site**	**Can #**	**Milt Date**	**Freeze Date**	**By**	**Hormone**	**Color**	**Volume mls**	**Pre freeze motility**		**Post freeze motility**		**Straws**	**Comments**
452738076E	CMR	1	6/6	6/10	RH	none	2%		90%	5	5%	2	106	9-5 ml straws
1F4A4B5973	CMR	-	6/16		RH	none	light	20	0 %	-	-	-	-	DOA, froze in 2001
411D0E2C5F	CMR	5	6/11	6/13	RH	none	v light	20	90%	5	5+%	3	100	4 -5 ml straws
452A4E1F15	CMR	2	6/6	6/10	RH	LH-RH	2%	110	90%	5	5%	3	104	12-5 ml straws
452A4E1F15	CMR	6	6/6	6/19	GL				60%	3	40%	2	98	2nd sample
220E4E4E5D	GAD			6/26	GL				70%	3	0%	-	0	Straws discarded
132157621A	GAD	4	6/30	7/1	ME?				90%		5%	3	100	7-5 ml straws
7F7D372A6B	GAD	8	6/25	6/25	GL				70%	2+	20%	2	100	MeOH change
132313521A	GAD	8	6/25	6/25	GL				70%	2+	5%	1	100	
757D365422	GAD	-	6/25	-	-				<1%	1	-	-	0	
1F521B1E56	GAD	6	6/25	6/25	GL				60%	3	2%	2	100	jerky
1F521B1E56	GAD	1	6/25	7/4	ME				60%	3	5%	2	100	2-5 ml straws
1F4A13592B	GAD	9	6/25	6/26	GL				60%	3	35%	2	100	
7F7D291A07	GAD	7	6/25	6/25	GL				80%	3	20%	3	100	jerky
1F4A363031	GAD	7	6/25	6/25	GL				30%	2	50%	4	99	jerky
115675486A	GAD	10	6/25	6/26	GL				60%	3	50%	3+	99	
220E5F6E26	GAD		6/30	7/1										no milt
1F47760123	MC	3	7/2	7/3	ME				65%	2	2%	3	100	

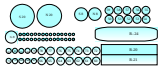
115669540A	MC	2	7/2	7/3	ME				50%	1	<1%	1	100	
132114552A	MC	9	7/2	7/4	ME				40%	1+	1%	1	100	

Table 21. Post Spawn Blood Values

Blood Analysis - Pallid Sturgeon Garrison Dam NFH - 2003					
Female #	**694A (&)**	**185B (&)**	**486A (%)**	**6E26 (%)**	**6102 (%)**
WBC	26,015 ul		11,660 ul	4,180 ul	12,155 ul
RBC	0.59 x 10^6		1.66 x 10^6	1.26 x 10^6	0.85 x 10^6
PCV	15.0%		46.0%	34.5%	23.5%
hemo			marked Hemol	mod. Hemol	
HGB	3.8 g/dl		13.2 g/dl	11.6 g/dl	6.9 g/dl
TPP	2.9 g/dl		4.1 g/dl	5.3 g/dl	4.1 g/dl
ALB	0.00 g/dl	0.94 g/dl	0.33 g/dl	0.47 g/dl	0.64 g/dl
ALKP	118 U/L	145 U/L	181 U/L	112 U/L	73 U/L
ALT	<10 U/L	< 10 U/L	<10 U/L	<10 U/L	<10 U/L
AMYL	0 U/L	5 U/L	0 U/L	7 U/L	0 U/L
BUN	0.6 mg/dl	0.8 mg/dl	0.8 mg/dl	0.5 mg/dl	0.9 mg/dl
Ca	6.85 mg/dl	7.46 mg/dl	7.44 mg/dl	7.60 mg/dl	8.86 mg/dl
CHOL	159.4 mg/dl	297.9 mg/dl	159.4 mg/dl	213.0 mg/dl	114.3 mg/dl
CREA	0.42 mg/dl	0.35 mg/dl	0.45 mg/dl	0.42 mg/dl	0.26 mg/dl
GLU	1.6 mg/dl	29.4 mg/dl	27.3 mg/dl	34.7 mg/dl	43.3 mg/dl
PHOS	4.86 mg/dl	6.73 mg/dl	8.85 mg/dl	7.79 mg/dl	8.68 mg/dl
TBIL	<0.10 mg/dl	<0.10 mg/dl	<0.10 mg/dl	<0.10 mg/dl	<0.10 mg/dl
T Protien	1.96 g/dl	3.95 g/dl	2.87 g/dl	3.69 g/dl	3.53 g/dl
GLOB	1.96 g/dl	3.01 g/dl	2.55 g/dl	3.22 g/dl	2.88 g/dl
Na	115.8 mmol/l	104.1 mmol/l	133.8 mmol/l	127.7 mmol/l	134.7 mmol/l
K	– mmol/l	3.53 mmol/l	– mmol/l	– mmol/l	– mmol/l
Cl	99.1 mmol/l	86.0 mmol/l	110.8 mmol/l	110.4 mmol/l	114.0 mmol/l
PCV	16%	22%	35%	33%	23%

Figure 1.

Pallid Building



Tank Layout

Appendix 1. Garrison Dam NFH Tank Capacities at ½ Pound Per Square Foot

Tank Size	Num	sqft each	# 5 inch fish	# 7 inch fish	# 8 inch fish	# 9 inch fish	total capacity 5 inchers	total capacity 7 inchers	total capacity 8 inchers	total capacity 9 inchers
4 foot circ.	10	12.6	359	132	88	63	3591	1323	882	630
5 foot circ.	24	19.6	559	206	137	98	13406	4939	3293	2352
8 foot circ.	3	50.2	1431	527	351	251	4292	1581	1054	753
TOTAL	37		2348	865	7	412	21290	7844	5229	3735
Overflow Options										
20 foot circ.	2	628	17898	6594	4396	3140	35796	13188	8792	6280
Raceway 24	1	480	13680	5040	3360	2400	13680	5040	3360	2400

Appendix 2. 2003 Stocking of 2002 Pallid Sturgeon Progeny

Family Cross		Garrison Dam NFH			Gavins Point NFH			Miles City SFH			Neosho NFH		
Female	Male	#	Date	RPA	#	Date	RPA	#	Date	RPA	#	Date	RPA
116224546A	1F477B3A65	1323	7/16	4	653	8/28	2				793	10/24	4
					120	7/25	3						
					383	9/4	4						
					40	brood	GAP						
116224546A	116167123A	1419	7/16	4	652	8/28	2						
					121	7/25	3						
					40	brood	GAP						
116224546A	220F107A6F	1601	7/16	4	120	7/25	3	2173	8/07	2	738	10/24	4
					529	9/4	4						
					40	brood	GAP						
116224546A	1F4A27214F				120	7/25	3						
					361	9/4	4						
					40	brood	GAP						
116224546A	7F7D461025	1104	7/16	4	653	8/28	2				728	10/24	4
					120	7/25	3						
					262	9/4	4						
					40	brood	GAP						
4310187B69	7F7D434B54	47	8/25	GAP		brood							
TOTAL		5494			4294			2173			2259		

Appendix 3. 2002 Stocking of 2001 Pallid Sturgeon Progeny

Family Cross		Garrison Dam NFH		Gavins Point NFH		Miles City SFH		Bozeman FTC		Neosho NFH		TOTALS	
Female	Male	#	RPA	#	RPA	#	RPA	#	RPA	#	RPA	#	RPA
411D262C1F	41476A0462	424	2					553	1			2058	1
		352	3										
		1461	4										
411D262C1F	17509415139	338	2					546	1			3061	2
		70	3										
		170	4					85	2				
411D262C1F	411D0B4E09	191	2					176	1			843	3
411D262C1F	1F4A4B5973	353	2					494	1			6840	4
		70	3										
		69	4					73	2				
411D262C1F	411D0E2C5F	320	2					289	1				
		70	3										
		1671	4										
7F7F06672B	7F7D3C5708	70	3			247	2			289	4		
		564	4										
7F7F06672B	115631222A	71	3			298	2						
		180	4										
220E345E09	1F4A27214F	70	3			366	2			21	4		

		1071	4										
220E345E09	1F4A111C6A	70	3			366	2			646	4		
		698	4										
TOTAL		8353		0		1277		2216		956			

Appendix 4. Milt Repository at Garrison Dam NFH

Pit Tag	Year	Source	Straw Size (ml)	~ #	Dewar #	Cane Location #	Motility (fresh)	Motility (pre freeze)	Motility (post freeze)
7F7F054773	2000	GAD	0.5	4	1	4	90%		
2202236E31	2000	CMR	0.5	4	1	4	95%	5%	
115712453A	2000	GAD	0.5	4	1	4	85%		
1F4A004552	2000	GAD	0.5	4	1	4	90%		
1F4A33194B	2000	GAD	0.5	4	1	4	95%		
1F4A143350	2000	GAD	0.5	5	1	4	90%		
1F4A27214F	2001	MC	0.5	25	1	1			
	2001	MC	5	3	1	2			
1F4A111C6A	2001	MC	0.5	20	1	1			
	2001	MC	5	4	1	2			
115631222A	2001	MC	0.5	20	1	1			
	2001	MC	5	3	1	2			
7F7D3C5708	2001	MC	0.5	20	1	1			
	2001	MC	5	4	1	2			
411D0B4E09 (2265)	2001	CMR	5	1	1	4			
	2001	CMR	0.5	10	1	4			
17509415139	2001	CMR	0.5	10	1	4			
41476A0462	2001	CMR	0.5	20	1	4			
	2001	CMR	5	1	1	4			
411D0E2C5F	2001	CMR	0.5	20	1	4			
	2001	CMR	5	1	1	4			
1F4A4B5973	2001	CMR	0.5	5	1	4			
7F7D434B54	2002	GAD	0.5	40	1	5	40%		
1F477B3A65	2002	GAD	0.5	10	1	5	90%		
	2002	GAD	0.5	70	1	7	90%		

7F7D461025	2002	CMR	0.5	40	1	6			
7F7F065834	2002	GAD	0.5	40	1	6			
115556461A	2002	GAD	0.5	40	1	7			
1F4772396F	2002	GAD	0.5	40	1	8	35%		

220F107A6F	2002	GAD	0.5	40	1	8	85%		
116167123A	2002	GAD	0.5	40	1	9	75%		
1F4A3E1445	2002	GAD	0.5	40	1	9	80%		
115544332A	2002	GAD	0.5	40	1	10	90%		
452738076E	2003	CMR	0.5	130	2	1	90%		5%
	2003	CMR	5	6	2	3	90%		
411D0E2C5F	2003	CMR	0.5	100	2	5	90%		5+%
	2003	CMR	5	5	2	5	90%		
452A4E1F15	2003	CMR	5	5	2	4			
	2003	CMR	0.5	80	2	10	60%	30%	<1%
	2003	CMR	0.5	100	2	6		80%	40%
	2003	CMR	0.5	100	2	2			5%
132157621A	2003	GAD	0.5	70	2	4	95%		1-5%
7F7D372A6B	2003	GAD	0.5	50	2	8	70%	30-80%	20%
132313521A	2003	GAD	0.5	70	2	8	70%	1-25%	5%
1F521B1E56	2003	GAD	0.5	80	2	6	80%	0-80%	1 - 5%
	2003	GAD	0.5	70	2	1			<1%
1F4A13592B	2003	GAD	0.5	70	2	9	85%	50-85%	35%
7F7D291A07	2003	GAD	0.5	80	2	7	80%	1-20%	20%
1F4A363031	2003	GAD	0.5	80	2	7	50%	0-5%	50%
115675486A	2003	GAD	0.5	70	2	10	60%	30-70%	50%
1F47760123	2003	MC	0.5	70	2	3	65%	65%	1-2%
115669540A	2003	MC	0.5	60	2	2	50%	55%	<1- 2%
132114552A	2003	MC	0.5	80	2	9	40%	40%	1%
Total Straws (including 5 ml)				2008					

Dewar Capacity: 2000 ½ ml straws (10 straws/cane - 20 canes/canister - 10 canisters/dewar)

Thirty-nine males are represented in the repository as of 2003.

Appendix 5. Genetics Samples

Genetics Samples from Upper Basin Pallid Sturgeon								
Pit Tag #	Sex	Weight	Spawning Location	Stocked progeny	Milt Cryo	Capture Site	Comments	Yr of Genetics
1F4A436E66	F	46		N		Confluence	immature eggs, released fish	2000
1F47715752	F	55	GAD	N		Confluence	Spawned, overripe eggs, no survival	2000
1F477B3A65	M	27		N	Y	Confluence	Spawned in 1999 also	2000
7F7F054773	M	50	GAD	N	Y	Confluence		2000
7F7F065A3D	F	55		N		Confluence	atritic eggs at capture	2000
1F4A143350	M	28	GAD	N	Y	Confluence		2000
1F4B225A1A	?	31		N		Confluence	old fish - Injected in 2000 - no results	2000
1F4A004552	M	25	GAD	N	Y	Confluence		2000
7F7B081579	M	32	GAD	N		Confluence		2000
1F4A33194B	M	45	GAD	N	Y	Confluence		2000
115712453A	M	27	GAD	N	Y	Confluence		2000
1F4849755B	M	33	GAD	N		Confluence		2000
115713555A	F	57	GAD	N		Confluence	mature eggs, poor spawn, no survival	2000
115676690A	F			N		Confluence	immature hybrid shovelnose??	2000
11552S534A	M	32	GAD	N		Confluence		2000
2200F0F6213	F	36	GAD	N		Confluence	aged at 36 years, & died post spawn	2000
2202236E31	M	61	GAD	N	Y	Confluence		2000
7F7F06672B	F	43	MCSFH			Confluence	Spawned	2001
220E345E09	F	59	MCSFH			Confluence	Spawned	2001
115631222A	M	29	MCSFH		Y	Confluence	Spawned	2001

7F7D3C5708	M	50	MCSFH		Y	Confluence	Spawned	2001
1F4A111C6A	M	30	MCSFH		Y	Confluence	Spawned	2001
1F4A27214F	M	48	MCSFH		Y	Confluence	Spawned	2001
411DOB4E09	M	-	CM Russel	Y	Y	Upper Mo	Spawned	2001
41476A0462	M	34.0	CM Russel	Y	Y	Upper Mo	Spawned	2001
17509415139	M	31.3	CM Russel	Y	Y	Upper Mo	Spawned	2001
411D0E2C5F	M	33.0	CM Russel	Y	Y	Upper Mo	Spawned	2001
411D262C1F	F	49.1	CM Russel	Y		Upper Mo	Spawned	2001
1F497F1801	F		MCSFH	N	N	confluence	spawned - no survival of eggs	2002
1F482F3F2B	?	26.5	MCSFH	N	-	confluence	no milt	2002
7F7F065834	M		MCSFH	N	Y	confluence		2002
115556461A	M		MCSFH	N	Y	confluence		2002
115553544A	F	41	-	-	-	confluence	immature eggs, taken to hatchery	2002
4310187B69	F	37	GAD	N	-	confluence	progeny for broodstock only	2002
115544332A	M	55	GAD	N	Y	confluence		2002
1F4A3E1445	M	34	GAD	N	Y	confluence	1F4A2F3A2E, two tags	2002
1F477B3A65	M	28	GAD	N	Y	confluence	spawned 3 other times	2002
1F4772396F	M	53	GAD	N	Y	confluence	Died post spawn	2002
115716093A	M	40	GAD	N	N	confluence	new fish, gasket around head	2002
116167123A	M	50	GAD	Y	Y	confluence	new fish	2002
7F7D434B54	M	30	GAD	N	Y	confluence	future brood only	2002
116224546A	F	60	GAD	Y	-	confluence		2002

1F5420727B	F	68	GAD	N	-	confluence	Died pre-spawn 'hormone shock'	2002
1F53312736	M		GAD	N	N	confluence	2nd tag # 1F52167900	2002
220F107A6F	M	~50	GAD	Y	Y	confluence		2002
NO TAG	F		-	-	-	confluence	shovelnose hybrid ? Mature eggs	2002
44426F185B	F	53	GAD	Y	-	confluence		2003
220E4E4E5D	M	35	GAD	N	N	confluence		2003
132157621A	M	35	GAD	Y	Y(5%)	confluence		2003
7F7D372A6B	M	32	GAD	N	Y(20%)	confluence		2003
132313521A	M	40	GAD	Y	Y(5%)	confluence		2003
41475D3C5D	M		GAD	Y	N	confluence		2003
1F521B1E56	M	33	GAD	Y	Y (2%)	confluence		2003
1F4A13592B	M	36.5	GAD	Y	Y(35%)	confluence		2003
7F7D291A07	M	38.5	GAD	Y	Y (20%)	confluence		2003
115676694A	F	30	GAD	N	-	confluence	& died - a few progeny survived	2003
1F4A363031	M	45	GAD	Y	Y (50%)	confluence		2003
115675486A	M	27	GAD	Y	Y (50%)	confluence		2003
7F7B026102	F	44	GAD	N	-	confluence		2003
220E5F6E26	?	56	GAD	N	-	confluence	no milt	2003
115679394A	F	28	MC	N	-	confluence	progeny for future broodstock	2003
7F7F054855	F	39	MC	Y	-	confluence		2003
132256586A	F	59	MC	Y	-	confluence		2003
1F47760123	M	33	MC	Y	Y (2%)	confluence		2003

7F7F065A4E	M	46	MC	N	N	confluence	died prior to spawning	2003
115669540A	M	32	MC	Y	Y (<1%)	confluence		2003
132114552A	M	24	MC	Y	Y(1%)	confluence		2003
KAP1	?	-	-	-	-		Collected 9/30/03	2004
43105C602B	?	28	-	-	-	Dredge Cuts	Collected 11/19/03	2004

Appendix 6. Pallid Augmentation in Recovery Priority Areas 1-3.

Pallid Augmentation in the Upper Basin													
Year of Spawn	**Hatchery of origin** Mating design Effective population(Ne)	**Female** Pit tag (last 3 digits)	**Male** Pit tag (last 3 digits)	**RPA #1**			**RPA #2**			**RPA #3**			**Total stocked per family**
				No. stocked	Cumulative*		No. stocked	Cumulative*		No. stocked	Cumulative*		
					Effective population size (Ne)	Frequency of inbreeding (F/gen)		Effective population size (Ne)	Frequency of inbreeding (F/gen)		Effective population size (Ne)	Frequency of inbreeding (F/gen)	
1997	Gavins Point NFH	E04	439	138	4.8	10.4 %	154	4.8	10.4 %	80	4.8	10.4 %	369
	2 x 3*	E04	A07	138	2 X 3		154	2 X 3		80	2 X 3		373
	Ne = 4.8	E04	83D	138			154			79			372
		354	439	138			163			76			377
		354	A07	138			155			101			394
1998	Garrison Dam NFH 1 X 2	171	123	0			100	7.5	6.7 %	49	7.5	6.7 %	149
	Ne = 2.7	171	031	0			100	3 X 5		49	3 X 5		149
1999	Gavins Point NFH	573	774	0			160	10.2	4.9 %	67	10.2	4.9%	159
	1 X 2*	573	83D	0			159	4 X 7		50	4 X 7		159

	Ne = 2.7	573	62A	0			160			65			160
2001	Miles City SFH	E09	C6A	0			366	12.9	3.9%	0	10.2	4.9%	366
	(2) 1 X 2	E09	14F	0			366	5 X 9		0	4 X 7		366
	Ne = 5.4	72B	708	0			247	15.5	3.2%	0	10.2	4.9%	247
		72B	22A	0			298	6 X 11		0	4 X 7		298
2001	Bozeman FTC	CIF	973	494	8.7	5.7 %	73			0			567
	1 X 5	CIF	C5F	289	3 X 8		0			0			289
	Ne = 3.3	CIF	462	553			0			0			553
		CIF	E09	176			0			0			176
		CIF	139	546			85			0			631
2001	Garrison Dam NFH	E09	C6A	0			0			70	12.9	3.9 %	70
	(2) 1 X 2	E09	14F	0			0			70	5 X 9		70
		72B	708	0			0			70	15.5	3.2 %	70
	Ne = 5.4	72B	22A	0			0			71	6 X 11		71
	1 X 5	CIF	973	0			353	19.5	2.6 %	70	19.1	2.6 %	423
	Ne = 3.3	CIF	C5F	0			320	7 X 16		70	7 X 15		390
		CIF	462	0			424			352			776
		CIF	E09	0			191			0			191
		CIF	139	0			338			70			408
2002	Garrison Dam NFH	546A	3A65	0			0			0			0

	1 X 4	546A	123A	0			0			0			0
	Ne = 3.2	546A	7A6F	0			0			0			0
	1 X 1	546A	1025	0			0			0			0
	Ne = 2.0	7B69	4B54	0			0			0			0
2002	Gavins Point NFH	546A	3A65	0			653	22.9	2.2 %	120	22.5	2.2 %	773
	1 X 5*	546A	123A	0			645	8 X 20		121	8 X 19		773
	Ne = 3.3	546A	7A6F	0			0			120			120
		546A	1025	0			653			120			773
		546A	214F	0			0			120			120
2002	Miles City SFH	546A	7A6F	0			2173	22.9 8x20	2.2%	0			2173

2003	Garrison Dam NFH	185B	1A07	0			0			0			0
	1 X 5	185B	1E56	0			0			0			0
	Ne = 3.3	185B	3C5D	0			0			0			0
		185B	3031	0			0			0			0
		185B	592B	0			0			0			0
	1 X 3	4855	540A	0			0			0			0
	Ne = 3.0	4855	486A	0			0			0			0
		4855	521A	0			0			0			0
	1 X 3	586A	0123	0			0			0			0
	Ne = 3.0	586A	552A	0			0			0			0
		586A	621A	0			0			0			0
2003	Miles City SFH	4855	540A	0			0	28.2	1.8%	0			0
	(2)1X2	4855	486A	0			0	10 X 24		0			0
	Ne =5.3	586A	552A	0			0			0			0
		586A	621A	0			0			0			0

2003	Gavins Point NFH	185B	1A07	0			0			0	26.2	1.9%	182
	1 X 5	185B	1E56	0			0			0	9 X 24		182
	Ne = 3.3	185B	3C5D	0			0			0			182
		185B	3031	0			0			0			182
		185B	592B	0			0			0			182
	1 X 3	4855	540A	0			0			0	29.2	1.7%	182
	Ne = 3.0	4855	486A	0			0			0	10 X 27		182
		4855	521A	0			0			0			182
	1 X 3	586A	0123	0			0			0	32.2	1.6%	182
	Ne = 3.0	586A	552A	0			0			0	11 X 30		182
		586A	621A	0			0			0			182

2003	Bozeman FTC 1 X 2	185B	3C5D	0	11.4	4.4%	0			0			41
	Ne = 2.7	185B	3031	0			0			0			540
	1 X 2	4855	540A	0	14.1	3.5%	0			0			495
	Ne =2.7	4855	486A	0			0			0			1647
	1 X 2	586A	0123	0	16.8	3.0%	0			0			91
	Ne =2.7	586A	621A	0			0			0			946
TOTAL				2748	16.8	3.0%	8644	28.2	1.8%	2140	32.2	1.6%	19299

*Numbers are approximate and based on what could have been achieved with equalized representation

Listing of Tables

FISCAL YEAR 2003 STURGEON ACTIVITIES AND ACCOMPLISHMENTS

by

Herb Bollig

Gavins Point National Fish Hatchery
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December 1, 2003

The Gavins Point National Fish Hatchery (NFH) has been involved in the propagation, stocking, and recovery of the endangered pallid sturgeon for nearly 13 years. The hatchery is one of the primary cultural facilities for the recovery of depleted, endangered, "Species of Concern", and candidate fish with primary emphasis focusing on the paddlefish, shovelnose and pallid sturgeon, and lesser emphasis on the sturgeon and sicklefin chubs and the surrogate flathead chub. The Gavins Point NFH was designated as the lead facility for the propagation and stocking of these species. Our field station is currently holding 32 families (7 year-classes) of future (captive) pallid sturgeon broodstock; rearing one year-class of juveniles for stocking purposes; sampling these fish for disease; conducting INAD (LHRH) investigations; and completed more modifications to accommodate the Sturgeon and Endangered Species Buildings to culture unique species of fish. It appears more likely that our facility may receive reimburseable funding from the U.S. Army Corps of Engineers to facilitate the construction of the new **Advanced Rearing and Broodstock Holding Facility**.

Fiscal Year 2003 was the sixth consecutive year that pallids were stocked in the Missouri River Basin from our hatchery, with this year's fish being stocked in RPMA's 2, 3, and 4. Pallid Sturgeon Recovery Plan (PSRP) objectives were addressed through agency cooperation, research, and hatchery propagation. Our hatchery continues to operate at or near capacity in an effort to produce fish that will be stocked in high Recovery Priority Management Areas (RPMA) throughout the upper Missouri River and its tributaries. No spawning of any sturgeon adults occurred at our hatchery during Fiscal Year 2003; but spawning did occur at the Miles City SFH, MT, with the Gavins Point NFH taking the lead on this work. We have developed an excellent partnership with the Montana Fish, Wildlife, and Parks and the staff at the Miles City SFH, Miles City, MT, and have successfully spawned pallids at their facility because of this cooperative effort. Disease inspections (for iridovirus and other diseases) have been conducted twice-yearly at the Gavins Point NFH for the last several years with the pallid sturgeon testing positive, but not symptomatic. Sturgeon propagation and stocking has been seriously affected by viral concerns.

The short-term goal of the PSRP is to prevent extinction of the pallid sturgeon species. This may only be possible by removing adults from the wild, propagating and stocking fish, and establishing captive broodstock populations. The long-term recovery objective of this plan is to recover and restore these fish in the freeflowing reaches of the Missouri River Basin. Additionally, the objective is to downlist and delist the species by 2040 through protection and habitat restoration activities, providing that the following criteria are met: 1) naturally reproducing, self-sustaining populations exist within each recovery area, and that 2) a minimum of 10 per cent of the sturgeon population within each recovery area is comprised of mature females.

The following is an account of what has been accomplished at the Gavins Point NFH during the 2003 Fiscal Year, chronologically:

After 20,950 pallid sturgeon fry (2002 year-class) were transferred from the Garrison Dam NFH, ND, to our facility in July, 2002, two months later (September, 2002) 2,000 juveniles (23.1 lbs.) were shipped to the Columbia Lab, MO, for their use in approved research pertaining to the recovery of that species. In mid-December, 2002, exactly 3,740 (112.6 lbs.) juveniles from three families were transferred to the Neosho NFH, MO, for rearing, and later tagging and stocking in RPMA # 4.

Personnel from the Bozeman Fish Health Center (FHC) were at our hatchery on 10/22/02 and 5/13/03 to disease sample 2001 and 2002 year-class pallid sturgeon. Results show that these fish were positive for iridovirus when examined histologically, but not symptomatic.

Plumbing supplies and circular fiberglass tanks were received both in November and December, 2002, that will be used during the construction of the new Advanced Rearing and Broodstock Holding Facility that should be built in Fiscal Year 2004. These items were all purchased with End-Of-Year funding furnished by the Corps of Engineers.

All nine families of 2001 year-class pallid sturgeon stocking fish and future broodstock were PIT tagged on 11/15/02. On 11/20/02 only those 2001 year-class fish, excess to future broodstock needs, were stocked into the Missouri River at Mulberry Bend, NE (25.5 lbs. @ 3.14 fish/lb. = 80 fish; Ave. = 12.837 inches fork length) and Bellevue, NE (17.6 lbs. @ 4.49 fish/lb. = 79 fish; Ave. = 11.702 inches fork length).

Herb Bollig attended the Upper Basin Pallid Sturgeon Workgroup Meeting at the Miles City Community College, Miles City, MT, on 12/3-4/02.

The Pallid Sturgeon Fact Sheet and Brochure, Gavins Point NFH Fact Sheet, and other pertinent information was forwarded to Linda Andreasen, WO, Washington, D.C. to be used for the pallid sturgeon segment of the 2004 Budget Submission.

A total of 112.6 lbs. @ 33.21 fish/lb. = 3,740 pallid sturgeon (6.48 inches fork length), representing three families, were shipped to the Neosho NFH, MO, on 12/18/03 for their rearing, tagging, and stocking program in the lower Missouri River (RPMA # 4).

Herb Bollig and Keith McGilvray attended the Middle Basin Pallid Sturgeon Workgroup Meeting on 1/7-10/03.

On several occasions throughout the Fiscal Year, Rob Klumb (Great Plains FWMAO, Pierre, SD) conducted research at our hatchery with fish that were surplus to our needs for future broodstock or stocking. This research was entitled "Bioenergetics Model Development For Juvenile Pallid Sturgeon". He is exploring trophic interactions between fishes and their prey by using bioenergetics models. The objectives of this project were to derive empirical respiration parameters and energy densities for pallid sturgeon. It will expand our knowledge of the physiology and biology of this species.

The hatchery crew worked on the filter and ultraviolet light disinfection systems, contained within the Endangered Species Building, on 3/10-14/03, to make modifications and do our annual maintenance. The two UV systems were dismantled and replumbed so that each one can be operated separately or both at the same time. The filter was disassembled, cleaned, and new, clean, 17 micron filter panels reinstalled. All of the work was supported and funded by the reimburseable agreement that we have with the U.S. Army Corps of Engineers.

Herb Bollig attended the March 20, 2003, Annual Pallid Sturgeon Planning Meeting at the Montana Fish, Wildlife, and Parks Regional Office, Miles City, MT.

Starting in March, 2003, the Sturgeon Grower 0305 diet was provided to us by Rick Barrows, Bozeman FTC, MT, to be used as a broodstock diet for the 1998 year-class future spawners. This is a test diet to see whether the sturgeon will consume the feed and how well they perform on it once they start eating. Results, thus far, look promising for the use of this diet as a broodstock food.

On occasion throughout the spring hatchery employees assisted the Great Plains FWMAO, Pierre, SD, to do sampling of the pallid sturgeon in the Missouri River below Fort Randall Dam. Sonic-tagged subadults were relocated on that stretch of the River. Both field stations worked cooperatively to get this study initiated, which consisted of rearing, tagging, and stocking of these fish. The goal of this study was to identify and characterize areas of the River frequented by the pallids.

On June 23-24 Herb Bollig and Keith McGilvray traveled to the Miles City SFH, MT, to cathetorize the three pallid sturgeon adult females that were located there for spawning purposes. Eggs were collected from all females, boiled in Ringers solution, and sectioned in order to better see the position of the nucleus within the egg. Polarization Indices were determined for the three fish, which was very close to .10. We made the decision to not spawn these fish and wait another week before assessing the spawning situation again.

Keith and Herb returned to Miles City SFH, MT, again on June 30th and July 1st, and recathetorized the three adult pallid sturgeon females located there. Eggs were staged and found to be mature enough (Polarization Index = .06-.08) for LHRH injections and spawning. LHRH injections were given at approximately 5:00 p.m. to all males and females with the resolving dose given to the females only the next morning (July 1). Milt was precollected from the males. Spawning took place the afternoon and evening of July 1st, and the morning of July 2nd. Precollected sperm (milt) from males located at the Miles City hatchery was transported by Montana Fish, Wildlife, and Parks personnel to the Garrison Dam NFH, ND, for cryopreservation; and sperm from the male pallids located at the Garrison Dam NFH was transported to Miles City to complete the various crosses to make the families required. A total of 6 families were made from the 224,049 green eggs produced. Overall eyeup was 86.3 per cent. Newly spawned pallid sturgeon eggs were eventually transported to the Garrison Dam NFH; Bozeman FTC, MT; USGS, Jackson, Wyoming; and the remainder remained at the Miles City hatchery.

We received the permits from the States of South Dakota and Nebraska on July 14th to stock tagged pallid sturgeon juveniles into the Missouri River below Fort Randall Dam and above Lewis and Clark Lake, specifically the Sunshine Bottoms and Chief Standing Bear Bridge accesses.

On July 16th we assisted the Garrison Dam NFH with the distribution of pallid sturgeon juveniles after tagging at their hatchery. We provided our distribution truck for the transportation of these particular fish to our hatchery, where Marv Ehlers took over the driving duties. He then hauled the 1,423 pallids down river to the State of Missouri where they were stocked at the Booneville access site.

Dave Carlson, Northland Outdoors Host/Producer, Eau Claire, WI, was at the Gavins Point hatchery on July 23rd to visit our facility and tour the Endangered Species Building, and videotape the various pallid sturgeon year-classes we have for the Northland Outdoors program. An interview was conducted with hatchery personnel concerning the Missouri River, endangered species, and the native species stocking program that we have at our hatchery. This syndicated program was aired on various Regional television outlets on August 2-3, 2003.

On July 24 the hatchery crew, with assistance from the Corps of Engineers, PIT tagged 601 pallid sturgeon juveniles (weighing 79.2 lbs.) from the 2002 year-class. Equal numbers of tagged fish from each of five families were stocked that same day below Fort Randall Dam in the Missouri River at Sunshine Bottoms and near the Chief Standing Bear Bridge. These fish were not elastomered tagged.

Herb attended the Upper Basin Pallid Sturgeon Propagation Subcommittee meeting at the Garrison Dam NFH, Riverdale, ND, on 7/30-31/03. The original 1993 Pallid Sturgeon Propagation/Genetics Plan is now being improved and updated to reflect the many things that have been learned since its initial development.

The hatchery crew PIT tagged 200 of the pallid sturgeon from the 2002 year-class for future captive broodstock on 8/06/03. Forty fish from each of the 5 family crosses were tagged.

On 8/22/03 the Ak-Sar-Ben Aquarium, Gretna, NE, obtained 6 large fingerling pallid sturgeon, weighing 1.25 lbs., for display and public outreach purposes at their aquarium. The aquarium is run by the Nebraska Game and Parks Commission.

On August 26 the staff from the Valentine SFH, NE; Great Plains FWMAO, SD; Missouri River FWMAO, ND; Garrison Dam NFH, ND; and our hatchery crew completed the PIT tagging and elastomere tagging of the 1,951 large pallid sturgeon fingerlings weighing 436.4 lbs.

On 8/28/03 2002 year-class pallid sturgeon were stocked into the Yellowstone River at Intake, MT (98.97 lbs. @ 4.951 fish/lb. = 490 fish; Ave. = 11.14" fork length) and Fairview, MT (107.98 lbs. @ 4.529 fish/lb. = 489 fish; Ave. = 11.40" fork length). Pallid sturgeon were, also, stocked into the Missouri River below Fort Peck Reservoir at Wolf Point, MT (115.67 lbs. @ 4.228 fish/lb. = 489 fish; Ave. = 11.66" fork length) and Culbertson, MT (113.80 lbs. @ 4.244 fish/lb. = 483 fish; Ave. = 11.71" fork length). Distance for the entire round trip was 1,498 miles. The Miles City SFH, MT, assisted with the stocking of fish at Wolf Point and Culbertson by picking them up at Intake, MT, and hauling and stocking them at the stocking sites below Fort Peck.

After receiving the Fish Import Permit from Montana Fish, Wildlife, and Parks in mid-August authorizing the Gavins Point NFH to stock 2002 year-class pallid sturgeon in the lower Yellowstone River and Missouri River (below Fort Peck Dam) in Montana, we provided a Fish Import Confirmation back to Jim Peterson regarding number of fish stocked, size, date of stocking, and tagging information. These fish were both PIT tagged and elastomere tagged.

On September 3 staff from the Valentine SFH, NE; Columbia FRO, MO; and our hatchery crew completed the PIT tagging and elastomere tagging of the 1,535 large pallid sturgeon fingerlings (2002 year-class) weighing 323 lbs. These fish were stocked on 9/3-4/03 in the Missouri River at Mulberry Bend, NE (103.6 lbs. @ 4.82 fish/lb. = 500 fish; Ave. = 11.00" fork length); Bellevue, NE (101.4 lbs. @ 4.93 fish/lb. = 500 fish; Ave. = 11.22" fork length); and Booneville, MO (118.0 lbs. @ 4.53 fish/lb. = 535 fish; Ave. = 11.50" fork length). Distance traveled for this distribution trip was 1,047 miles.

The results of the Luteinizing Hormone - Releasing Hormone (LHRH) Investigational New Animal Drug (INAD) study, Number 8061-03-11, was forwarded to the Bozeman INAD Office with all of the pallid sturgeon data generated during the spawning effort that occurred in late June and early July at the Miles City SFH, MT.

On 10/7-8/03 the Gavins Point NFH hosted the second meeting of the Propagation Subcommittee Meeting whose attendees were involved with the updating of the Pallid Sturgeon Propagation/Genetics Plan. Representatives from state and federal hatcheries; fish health centers (R3 & R6); Regional Offices (R3 & R6); Montana Fish, Wildlife, and Parks (Bob Snyder); Columbia, Missouri FRO; and Missouri River FWMAO, ND, were all here to provide input and complete this project.

Throughout the entire year the Gavins Point NFH has been storing pallid sturgeon sperm (milt) in the Taylor-Wharton cryogenic refrigerator that has been delivered to our field station from the Garrison Dam NFH and Warm Springs Fish Technology Center, Warm Springs, GA.

In an effort to provide captive pallid sturgeon broodstock with a more complete diet, the hatchery staff has been hatching disease-free, rainbow trout eggs and rearing these fish to fingerling size to feed to the larger, future spawners. They have been consuming these smaller fish quite well, and it is our hope to continue this effort on into the future.

Addendum

The hatchery staff continues to make many on and off-site presentations concerning endangered species and other parts of the hatchery program to school children, philanthropic organizations, civic groups, and campground visitors. During hatchery tours visitors receive a summary of the past and present accomplishments of the paddlefish and sturgeon production programs. Three of the guests that have visited the hatchery were Assistant Secretary of the Army for Civil Works, John Woodley; Brigadier General William Grisoli; and Lieutenant Colonel, Peter Taylor.

SPAWNING

See June 30 - July 2, 2003, account of activities (see above).

FUNDING

U.S. ARMY CORPS OF ENGINEERS FUNDING

The USACOE provided $33,749.59 of funding (after 13 % overhead costs were deducted) to the Gavins Point NFH for specific projects and activities during Fiscal Year 2003, as detailed below:

1)	Travel	$2,548.31
2)	Liquid Nitrogen	1,010.54
3)	Electrical	6,760.15
4)	Fish Food	6,796.54
5)	Chemicals and Antibiotics	831.20
6)	Distribution Expense (gasoline)	368.58
7)	Other Supplies[1]	15,434.18
		$33,749.50

[1]Other supplies includes butterfly valves, plumbing supplies, belt feeders, PIT tag reader and repair, aerators, feeder clocks and repair kits, and ultraviolet light bulbs.

REARING

The rearing characteristics of the six year-classes of pallid sturgeon, currently held at the Gavins Point NFH, can be found by viewing the following seven sections of tables that summarize the annual production within the two sturgeon buildings devoted to this activity at our hatchery. The seventh section is a summary of the first six sections. We are holding future broodstock from seven year-classes (a total of 32 families) at the time of the writing of this report. More stocking fish and future broodstock from the 2003 year-class were transferred to our hatchery from the Garrison Dam NFH, ND, during the months of October and November, 2003. All smaller production fish and future broodstock are being fed a 3:1 ratio of Silver Cup Salmon # 2 and Biodiet Grower 2.0 millimeter diets, respectively. All larger broodstock are being fed a combination of Silver Cup Salmon Broodstock Diet, Fish Technology Center 0305 Broodstock Test Diet, and live small fingerling rainbow trout.

Section I

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	**Lot Number:** PLS-ZZW-92-MO	**Number of Eyed Eggs:**
Initial Feeding------>	**Date:** 6/15/92 **Number:** 500 **Weight:** 1.094 grams/fish 1.20 lbs.(547gms) **Length:** 48.6602 mm 1.9158 inches	

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	12	81.2	34.4947	.0125	.0471	0	0	---	0	—	1.0	554.0
11-30-02	12	81.3	34.4947	.0125	.0471	0	0	---	0	—	0.1	554.1
12-31-02	12	81.4	34.4947	.0125	.0471	0	0	---	0	—	0.1	554.2
01-31-03	12	81.5	34.4947	.0125	.0471	0	0	---	0	—	0.1	554.3
02-28-03	12	81.6	34.4947	.0125	.0471	0	0	---	0	—	0.1	554.4
03-31-03	12	81.7	34.4947	.0125	.0471	0	0	---	0	—	0.1	554.5
04-30-03	12	82.0	34.4947	.0125	.0471	0	0	---	0	—	0.3	554.8
05-31-03	12	82.1	34.6123	.0126	.0474	0	0	---	0	---	0.1	554.9
06-30-03	12	85.1	34.9979	.0125	.0486	0	0	---	0	---	3.0	557.9
07-31-03	12	89.1	35.4977	.0133	.0502	0	0	---	0	—	4.0	561.9
08-31-03	12	93.0	35.9704	.0137	.0517	0	0	---	0	---	3.9	565.8
09-30-03	12	94.0	36.0893	.0138	.0521	0	0	---	0	---	1.0	566.8

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	5.0	3965	$2083.13	5.00	7.16	$3.76	.1000	22.5	2856.4	87.7
11-30-02	2.0	3967	2084.74	20.00	7.16	3.76	.0000	13.0	2869.4	88.1
12-31-02	2.0	3969	2086.35	20.00	7.16	3.76	.0000	10.0	2879.4	88.4
01-31-03	2.0	3971	2087.96	20.00	7.16	3.77	.0000	13.9	2893.3	88.8
02-28-03	2.0	3973	2089.57	20.00	7.17	3.77	.0000	11.0	2904.3	89.1
03-31-03	3.0	3976	2091.99	30.00	7.17	3.77	.0000	12.0	2916.3	89.5
04-30-03	4.0	3980	2095.22	13.3	7.17	3.78	.0000	17.5	2933.8	90.1
05-31-03	15.0	3995	2107.32	----—	7.20	3.80	.1176	24.4	2958.2	90.5
06-30-03	20.0	4015	2123.45	6.67	7.20	3.81	.3856	31.1	2989.3	90.4
07-31-03	25.0	4040	2143.61	6.25	7.19	3.81	.4998	36.2	3025.5	90.1
08-31-03	27.0	4067	2165.38	6.92	7.19	3.83	.4727	36.8	3062.3	89.9
09-30-03	14.0	4081	2176.67	14.00	7.20	3.84	.1189	32.7	3095.0	90.6

Section II

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	**Lot Number:** PLS-MRW-97-FR	**Number of Eyed Eggs:** 166,000
Initial Feeding------>	**Date:**7/15/97 **Number:** 12,830 **Weight:** 1.0 **Length:** 0.5775 inches	

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	103	296.0	26.4807	.0079	.1118	1	0	---	0	---	2.9	2078.5
11-30-02	103	296.2	26.4807	.0079	.1118	0	0	---	0	—	0.2	2078.7
12-31-02	103	297.0	26.4807	.0079	.1118	0	0	---	0	---	0.8	2079.5
01-31-03	103	298.0	26.4807	.0079	.1118	0	0	---	0	—	1.0	2080.5
02-28-03	103	299.0	26.4807	.0079	.1118	0	0	---	0	---	1.0	2081.5
03-31-03	103	300.0	26.4807	.0079	.1118	0	0	---	0	---	1.0	2082.5
04-30-03	103	305.0	26.4807	.0079	.1118	0	0	---—	0	---	5.0	2087.5
05-31-03	102	308.0	26.8885	.0081	.1145	1	0	---	0	—	3.0	2090.5
06-30-03	102	323.0	27.2861	.0084	.1184	0	0	---	0	---	15.0	2105.5
07-31-03	102	344.0	27.8220	.0087	.1236	0	0	---	0	---	21.0	2126.5
08-31-03	102	355.0	28.0937	.0089	.1264	0	0	---	0	---	11.0	2137.5
09-30-03	102	362.0	28.2635	.0091	.1281	1	0	---	0	---	7.0	2144.5

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	30.0	7773.0	$4531.57	10.34	3.74	$2.18	.1000	22.9	1560.5	60.2
11-30-02	6.0	7779.0	4536.41	30.00	3.74	2.18	.0000	15.4	1575.9	60.8
12-31-02	5.0	7784.0	4540.44	6.25	3.74	2.18	.0000	11.1	1587.0	61.3
01-31-03	5.0	7789.0	4544.47	5.00	3.74	2.18	.0000	12.1	1599.1	61.7
02-28-03	4.0	7793.0	4547.70	4.00	3.74	2.18	.0000	12.8	1611.9	62.2
03-31-03	5.0	7798.0	4551.73	5.00	3.74	2.19	.0000	17.0	1628.9	62.9
04-30-03	7.0	7805.0	4557.37	1.40	3.74	2.19	.0000	20.1	1649.0	63.7
05-31-03	31.0	7836.0	4582.37	10.33	3.75	2.19	.4078	24.5	1673.5	63.6
06-30-03	47.0	7883.0	4620.27	3.13	3.74	2.19	.3976	31.3	1704.8	63.8
07-31-03	73.0	7956.0	4679.14	3.48	3.74	2.20	.5359	34.7	1739.5	63.8
08-31-03	87.0	8043.0	4749.30	7.91	3.76	2.22	.2717	36.9	1776.4	64.6
09-30-03	70.0	8113.0	4805.75	10.00	3.78	2.24	.1698	32.6	1809.0	65.3

Section III

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	**Lot Number:** PLS-MRW-98-FR	**Number of Eyed Eggs:**
Initial Feeding------>	**Date:**7/1/98 **Number:** 2,000 **Weight:** .16 LB	**Length:** 0.5775 inches

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	55	83.0	21.7054	.0073	.0765	1	0	—--	0	---	0.8	488.2
11-30-02	51	83.1	21.7054	.0073	.0765	4	0	----	0	----	0.1	488.3
12-31-02	51	84.0	21.7054	.0073	.0765	0	0	----	0	----	0.9	489.2
01-31-03	51	85.0	21.7054	.0073	.0765	0	0	----	0	----	1.0	490.2
02-28-03	51	86.0	21.7054	.0073	.0765	0	0	----	0	----	1.0	491.2
03-31-03	51	87.0	21.7054	.0073	.0765	0	0	----	0	----	1.0	492.2
04-30-03	51	90.0	21.7054	.0073	.0765	0	0	----	0	---	3.0	495.2
05-31-03	53	94.3	22.8374	.0079	.0826	0	0	----	0	---	4.3	499.5
06-30-03	53	100.0	23.2550	.0082	.0860	0	0	----	0	----	5.7	505.2
07-31-03	53	115.0	24.2804	.0090	.0947	0	0	----	0	----	15.0	520.2
08-31-03	53	120.0	24.6015	.0093	.0976	0	0	----	0	----	5.0	525.2
09-30-03	54	127.0	24.8919	.0097	.1020	0	0	---	0	---	7.0	532.2

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	10.0	2940	$1727.87	12.5	6.02	$3.54	.1000	22.5	1311.8	62.1
11-30-02	3.0	2943	1730.29	30.00	6.03	3.54	0.0	12.7	1324.5	62.7
12-31-02	2.0	2945	1731.90	2.22	6.02	3.54	0.0	8.4	1332.9	63.1
01-31-03	2.0	2947	1733.51	2.00	6.01	3.54	0.0	13.4	1346.3	63.7
02-28-03	2.0	2949	1735.12	2.00	6.00	3.53	0.0	11.3	1357.6	64.3
03-31-03	3.0	2952	1737.54	3.00	6.00	3.53	0.0	14.0	1371.6	64.9
04-30-03	6.0	2958	1742.38	2.00	5.97	3.53	0.0	18.0	1389.6	65.8
05-31-03	17.0	2975	1756.09	3.95	5.96	3.52	1.1320	24.5	1414.1	63.5
06-30-03	22.0	2997	1773.83	3.86	5.93	3.51	.4176	31.3	1445.4	63.7
07-31-03	50.0	3047	1814.15	3.33	5.86	3.49	1.0254	36.2	1481.6	62.5
08-31-03	57.0	3104	1860.11	11.40	5.91	3.54	.3211	36.3	1517.9	63.2
09-30-03	32.0	3136	1885.91	4.57	5.89	3.54	.2904	32.1	1550.0	63.7

Section IV

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	Lot Number: PLS-MRW-99-FR	Number of Eyed Eggs: 124,680
Initial Feeding------>	Date:7/10/99 Number: 29,000 Weight: 2.26 Length: 0.5775 inches	

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	65	101.0	21.9021	.0088	.0769	0	0	----	0	----	2.6	1173.5
11-30-02	65	101.2	21.9021	.0088	.0769	0	0	---	0	---	0.2	1173.7
12-31-02	64	101.5	21.9021	.0088	.0769	1	0	----	0	----	0.3	1174.0
01-31-03	64	102.0	21.9021	.0088	.0769	0	0	----	0	----	0.5	1174.5
02-28-03	64	102.5	21.9021	.0088	.0769	0	0	----	0	---	0.5	1175.0
03-31-03	64	103.0	21.9021	.0088	.0769	0	0	----	0	----	0.5	1175.5
04-30-03	64	104.0	21.9021	.0088	.0769	0	0	----	0	----	1.0	1176.5
05-31-03	64	103.3	22.1607	.0089	.0777	0	0	----	0	----	0.0	1176.5
06-30-03	64	110.0	22.5948	.0093	.0811	0	0	----	0	----	6.7	1183.2
07-31-03	63	123.0	23.5016	.0100	.0872	1	0	----	0	----	13.0	1196.5
08-31-03	63	130.0	23.9067	.0104	.0906	0	0	----	0	---	7.0	1203.2
09-30-03	63	148.0	24.8832	.0113	.0991	0	0	----	0	---	18.0	1221.2

	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	15.0	5070	$2718.78	5.77	4.32	$2.32	.1000	22.4	966.7	45.3
11-30-02	6.0	5076	2723.62	30.00	4.32	2.32	0.0	12.5	979.2	45.9
12-31-02	3.0	5079	2726.04	10.00	4.33	2.32	0.0	9.6	988.8	46.4
01-31-03	3.0	5082	2728.46	6.00	4.33	2.32	0.0	13.9	1002.7	47.0
02-28-03	2.0	5084	2730.07	4.00	4.33	2.32	0.0	13.0	1015.7	47.6
03-31-03	3.0	5087	2732.49	6.00	4.33	2.32	0.0	13.3	1029.0	48.3
04-30-03	6.0	5093	2737.33	6.00	4.33	2.33	0.0	17.8	1046.8	49.1
05-31-03	17.0	5110	2751.04	---—	4.34	2.34	.2586	24.3	1071.1	49.6
06-30-03	33.0	5143	2777.65	4.93	4.35	2.35	.4341	31.0	1102.1	50.1
07-31-03	50.0	5193	2817.97	3.85	4.34	2.36	.9068	34.9	1137.0	49.6
08-31-03	57.0	5250	2863.93	8.14	4.36	2.38	.4051	36.6	1173.6	50.3
09-30-03	32.0	5282	2889.73	1.78	4.33	2.37	.9765	32.4	1206.0	49.6

Section V

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	Lot Number: PLS-MRW-2001-FR	Number of Eyed Eggs:
Initial Feeding------>	Date: July, 2001 Number: 475 Weight: 27.8 lbs. Length: 7.9587 inches	

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	443	147.2	13.6040	.0252	.1188	7	0	----	0	----	1.7	119.4
11-30-02	284	98.3	13.6040	.0170	.0803	0	159	43.1	0	----	0	119.4
12-31-02	284	99.3	13.6040	.0170	.0803	0	0	----	0	----	1.0	120.4
01-31-03	284	100.3	13.6040	.0170	.0803	0	0	----	0	----	1.0	121.4
02-28-03	284	101.3	13.6040	.0170	.0803	0	0	----	0	----	1.0	122.4
03-31-03	282	101.7	13.6040	.0170	.0803	2	0	----	0	----	0.4	122.8
04-30-03	269	103.3	13.6040	.0170	.0803	13	0	----	0	---	1.6	124.4
05-31-03	104	47.3	14.9884	.0134	.0631	165	0	----	0	---	0.0	124.4
06-30-03	104	56.6	15.8424	.0151	.0715	0	0	----	0	---	9.3	133.7
07-31-03	104	82.1	17.7701	.0196	.0924	0	0	----	0	---	25.5	159.2
08-31-03	104	94.3	18.5466	.0215	.1017	0	0	----	0	---	12.2	171.4
09-30-03	103	99.5	18.9129	.0159	.0752	1	0	----	0	---	5.2	176.6

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	30.0	485.0	$570.99	17.65	4.06	$4.78	.1141	22.9	191.3	33.9
11-30-02	15.0	500.0	580.94	----	4.19	4.87	.0000	15.0	206.3	36.5
12-31-02	10.0	510.0	587.57	10.00	4.24	4.88	.0000	11.4	217.7	38.6
01-31-03	9.0	519.0	593.54	9.00	4.28	4.89	.0000	12.9	230.6	40.8
02-28-03	8.0	527.0	598.85	8.00	4.31	4.89	.0000	13.0	243.6	43.2
03-31-03	9.0	536.0	604.82	22.5	4.36	4.92	.0000	17.4	261.0	46.2
04-30-03	34.0	570.0	627.38	21.2	4.58	5.04	.0000	20.2	281.2	49.8
05-31-03	17.0	587.0	638.66	---	4.72	5.13	1.3844	24.4	305.6	43.5
06-30-03	40.0	627.0	663.06	4.30	4.69	4.96	.8540	31.9	337.5	42.9
07-31-03	57.0	684.0	697.83	2.24	4.30	4.38	1.9277	36.2	373.7	38.1
08-31-03	65.0	749.0	737.48	5.33	4.37	4.30	.7765	35.6	409.3	38.7
09-30-03	49.0	798.0	767.37	9.42	4.52	4.35	.3663	33.0	442.3	40.4

Section VI

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Station: Gavins Point NFH	**Lot Number:** PLS-MRW-2002-FR	**Number of Eyed Eggs:**
Initial Feeding------>	**Date:**7/16/2002 **Number:** 20,953 **Weight:** 6.47 lbs.	**Length:** 1.5761 inches

Month 1	Fish on Hand Last Day of Month					Morts	Fish Shipped		Fish Added		Weight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-02	14866	447.8	6.4831	.0271	.1727	80	60	2.4	0	---	38.1	466.8
11-30-02	14388	439.2	6.4831	.0271	.1727	498	0	---	0	---	0.0	466.8
12-31-02	9896	290.2	6.4831	.0271	.1727	752	3,740	112.6	0	---	0.0	466.8
01-31-03	9400	287.5	6.4831	.0271	.1727	496	0	---	0	---	0.0	466.8
02-28-03	9340	282.4	6.4831	.0271	.1727	60	0	---	0	---	0.0	466.8
03-31-03	7600	233.1	6.4831	.0271	.1727	1738	2	0.1	0	---	0.0	466.8
04-30-03	5760	192.5	6.4831	.0271	.1727	1840	0	---	0	---	0.0	466.8
05-31-03	4588	207.4	7.3487	.0138	.0706	1112	60	2.0	0	---	17.0	483.8
06-30-03	4515	363.6	8.7828	.0202	.1035	73	0	---	0	---	156.2	640.0
07-31-03	3921	549.3	11.4115	.0241	.1284	0	601	79.2	0	---	264.9	904.9
08-31-03	1794	380.7	11.5000	.0400	.1891	176	1951	436.4	0	---	267.8	1172.7
09-30-03	200	58.5	13.0789	.0237	.1118	59	1535	323.1	0	---	1.3	1174.0

LOT HISTORY - PRODUCTION (INTENSIVE CULTURE)

Month 14	Fish Feed Expended			Conversion		Feed Cost/ Pound Gain 20	Current Month's Length Increase 21	Temperature Units		Temp. Units Per Inch Gain To Date 24
	Month	To Date						For Month 22	To Date 23	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19					
10-31-02	200.0	693	$1243.37	5.25	1.48	$2.66	.1824	22.9	111.5	22.7
11-30-02	66.0	759	1326.90	---	1.63	2.84	---	12.5	124.0	25.3
12-31-02	40.0	799	1377.52	---	1.71	2.95	---	8.4	132.4	27.0
01-31-03	31.0	830	1416.75	---	1.78	3.04	---	12.9	145.3	29.6
02-28-03	25.0	855	1448.39	---	1.83	3.10	---	13.1	158.4	32.3
03-31-03	40.0	895	1499.01	---	1.92	3.21	---	17.3	175.7	35.8
04-30-03	150.0	1045	1794.84	---	2.24	3.84	---	20.0	195.7	39.9
05-31-03	110.0	1155	1934.06	6.47	2.39	4.00	.8656	24.7	220.4	38.2
06-30-03	287.0	1442	2281.33	1.84	2.25	3.56	1.4341	32.2	252.6	35.1
07-31-03	408.0	1850	2775.01	1.54	2.04	3.07	2.6287	36.1	288.7	29.4
08-31-03	407.0	2257	3267.48	1.52	1.92	2.79	.0885	36.3	325.0	32.7
09-30-03	29.0	2286	3302.57	22.31	1.95	2.81	1.5789	34.0	359.0	31.2

Section VII

HATCHERY PRODUCTION SUMMARY (Intensive Culture)

Station: Gavins Point NFH	Peroid Covered: October 1, 2001 through September 30, 2002

Species/Strain and Stock 1	Fish on Hand Last Day of Period					To Date This Fiscal Year				
						Weight Gain 7	Feed Expended		Conver-sion 10	Percent Survival 11
	Number 2	Weight 3	Length 4	D.I. 5	FI 6		Pounds 8	Costs 9		
PLS-ZZW-92-MO	12	94.0	36.0893	.0138	.0521	13.8	121	97.57	8.77	100.0
PLS-MRW-97-FR	102	362.0	28.2635	.0091	.1281	68.9	365	298.37	5.30	98.1
PLS-MRW-98-FR	54	127.0	24.8919	.0097	.1020	44.8	206	166.10	4.60	100.0
PLS-MRW-99-FR	63	148.0	24.8832	.0113	.0991	50.3	227	183.05	4.51	96.9
PLS-MRW-2001-FR	103	99.5	18.9129	.0159	.0752	58.9	343	216.28	5.82	60.0
PLS-MRW-2002-FR	200	58.5	13.0789	.0237	.1118	745.3	1793	2150.24	2.41	54.3
Totals/Averages	534	889.0				982.0	3055	$3111.61	3.11	55.1

THE END